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ANNUAL CONVENTION OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION.

The occasion of the annual convention of the National Electric Light Association, which was held in San Francisco this week, was distinctive in several ways. Although held at a considerable distance from the centers of largest population of the country, involving long travel upon the part of a great many of those going to the convention, and following a year in which unusual business conditions have prevailed, involving much apprehension for the future, there was, nevertheless, a large and enthusiastic attendance. The convention was held during delightful weather conditions, and under most auspicious circumstances. The local Convention Committee was extravagant in its hospitality and generous provision for the entertainment of visitors. Splendid arrangements were made for the conduct of the various sessions, and unusual devotion to the proceedings counteracted the natural tendency for distractions from the serious work of the convention. The program, which was of unusual length, was carried out very successfully, and a great period of activity may be predicted as a result of the presentation of the many valuable papers and reports of the committees and the discussion which was presented in connection therewith. There was a notable quickening of enthusiasm and engendering of nation-wide interest through a better understanding of the differences in operating conditions in the eastern and western sections of the country. This was particularly noticeable after the deliberations of the hydroelectric sessions, and especially with reference to the report of the Committee on Overhead Line Construction.

The accounting sessions were of particular significance at this convention. The regulation of accounting by state commissions and the general adoption of uniform methods of accounting have increased the importance of the deliberations at the accounting sessions, and this feature of association work is going to receive a wider recognition and be given a deeper importance than has been accorded to it in the past. A separate Accounting Section has been formed with its own set of officers to look after interests along this line.

All of the Association visitors to San Francisco were enthusiastic over the completeness of the exhibits at the Panama-Pacific International Exposition, and were delighted with the wonders of the

illumination features of the exposition. The exhibits of manufacturers at the exposition grounds took the place of the exhibits usually made in connection with the convention, and no such exhibits were displayed at the convention hall itself. Special illuminations and other attractions in honor of the Association members were carried out, and these were greatly enjoyed by the delegates in attendance.

MAKING THE MOST OF THE RETURNING DELEGATE.

As only a small percentage of the workers in the central-station industry can attend any single convention of the National Electric Light Association, it is very much to the point that those obliged to remain on duty at home should not overlook the opportunities before them to make good use of their fortunate brethren when the latter return from the convention city. In the regular work at home the convention seems an undercurrent, and it is easy, within a day or two after the wanderers take up their routine tasks, to let slip chances to gain real good from their experiences. New problems are constantly arising, and it is surprising how quickly a convention becomes ancient history.

The work of the Association is too broad to be passed over thus lightly by the stay-at-homes. We need not emphasize the importance of scanning at least the abstracts of papers, committee reports and discussions published in the technical press, for the man who does not take the trouble to get the point of view of the industry on various matters which come to a head in this way once a year, misses more than he realizes. Every twelvemonth marks advances in many departments of the central-station industry which are significant to the man of insight, and as these evidences of progress impress themselves upon the delegate, he thereby becomes in a sense charged for the benefit, not only of his own personal work in the future, but for the welfare of his wide-awake associates in the home company.

In a gathering so many-sided things which appeal to one person in attendance may not in their entirety appeal to another, but out of the interchange of views which result in a free discussion of the trip and its lessons, may come very valuable results. The possibilities of suggestion in the interchange of opinions and in answering questions are not easily exaggerated. Even a representative of the auditing department, for instance, may notice just enough of a discussion between two men from the engineering departments of member companies to suggest a line of thought to one of his own engineering staff at home which may lead to the development of certain methods of practice that will pay the home company the cost of his trip several times over in the course of a year. The by-products of a convention are so numerous that informal gatherings during the present month in home companies to discuss the doings of the San Francisco meeting and of the informal but immensely valuable conversations between delegates will be worth a great deal to the stay-at-homes and the travelers alike.

THE PERSONNEL OF UTILITIES.

Nearly every successful business enterprise has had a modest beginning. The founder of the business is commonly its general manager, salesman, clerk, etc., all combined in one individual, who devotes himself conscientiously and intelligently to all the details of the enterprise so that its product soon wins the favor of the public. The growth of business calls for more and more assistants to aid in the production and sale of the output. As the business expands, the point may soon be reached where the economic necessity for division of labor results in more or less specialization of duties, many of which are often carried out in a blind and unintelligent way, due largely to failure to grasp the general scope of the business and the relation of its different branches.

In the utility business the disadvantages of excessive specialization without preliminary understanding of the general features and essential details of the business are peculiarly unfortunate. They may not affect the quality of the utility's product so much, except in emergencies. However, they do have a vital effect on the service and standing of the utility, in so far as this is influenced by direct contact of its employees, as representatives of the company, with its customers and with the public in general. That the importance of this contact is being appreciated is evident from the consideration which has been given this matter by the management of the more progressive utility companies and by the frequency with which it has been discussed at meetings of utility associations.

The great majority of complaints against utilities have their origin in boorish, uncivil and arbitrary conduct of utility employees in their relation to the company's patrons. From these seemingly trivial causes arise more serious complaints, followed by ill will and chronic prejudice against the utility company.

In most instances lack of courtesy is due to failure on the part of the employee to understand the importance of this element, and if the matter is presented to him the problem is soon solved. It must be made very emphatic that the public seldom comes in contact with the management and executive officers of the utility. The impression it forms of the utility company is gained almost entirely from its contact with the minor representatives.

Aside from lack of courtesy, another cause of dissatisfaction with utility employees is their frequent apparent lack of ability to answer simple questions relative to the service. While this may be more common in the case of street-railway companies where the car crews are not familiar with points along their lines about which the public most frequently inquires, it is also met with in employees of central-station companies, who are unable or unwilling to explain features connected with the system of rates, with the reading of meters, determination of maximum demand, etc. Most of this inability to answer pertinent questions is due to lack of training, and is therefore to be shouldered by the management directly. Every utility employee

should be conversant not only with the important elementary features of the utility service, but he should also be versed on matters of general public interest that are related to the service.

Frequently a short-sighted policy has been adopted by the management, which specifically instructs its employees not to answer questions, but to refer them to the head offices of the company. This involves needless red tape, and is not nearly as satisfactory in the impression which it gives the public as the ability to answer simple questions promptly and in a straightforward manner.

Much is being done through courses of lectures for and organizations of utility employees, such as the company sections of the National Electric Light Association, in relieving some of the difficulties mentioned in the foregoing paragraphs. Much more can be done, however.

EXHAUST VERSUS LIVE STEAM FOR HEATING.

In the effort to enlarge its field of activity and secure electrical power loads from industrial establishments which have hitherto operated their own power plants, the electric central station sometimes finds it expedient to supply heat as well as power, and thus is led to go into the district heating business. In any case the problem of heating is to be met, and the use of central-station power is financially justified only when a consideration of both heating and power requirements has been figured out upon each basis.

There is an opinion widely extant that the heating of buildings by exhaust steam is more economical than heating with live steam, and some advocates of the former method even go so far as to claim that less coal will be required by a heating plant when the steam is first passed through a prime mover and part of its heat transformed into mechanical energy. Such claims naturally have some basis in experience, but their wide propagation is undoubtedly aided by the fact that such a result will be to the pecuniary advantage of those interested in maintaining isolated plants in places where central-station power might otherwise be utilized. In buildings where at times exhaust steam, at other times live steam is used for heating purposes, it is frequently found that more coal will be used on Sundays, or at other times when there is little or no power load, than when power is being generated. In a discussion of this question which came up at the convention of the National District Heating Association last week, it was brought out, for instance, that the water feed to the boilers of the plant in the Wisconsin State Capitol building at Madison was no greater when a large power load was being supplied than when the heating alone was provided for. Many others of those who discussed this question presented evidence showing that the coal or the water consumption was no greater and might even be less at times when power was generated and the exhaust steam used for heating.

The main question to be considered in this connection, however, is, what are the conditions under which the steam is used. These conditions are seldom or never the same for the live steam as for the exhaust steam. Even though a reducing valve is used in connection with live steam, it is probably not true that the same pressure in the main and the same temperature of radiators is maintained in both cases. Consequently, deductions made from figures of coal consumption or boiler feed cannot be taken as decisive in this matter. Certainly if steam enters the radiators at a higher temperature there will be more heat given out, and consequently more must be supplied. Undoubtedly this is the case where radiators usually supplied with exhaust steam are temporarily supplied with live steam, and it is notorious that under such cases windows are more likely to be opened than are supply valves to be closed.

Certainly no sane man will claim that more heat can be taken from a pound of exhaust steam than the heat content of that steam. Moreover, if the discharge from radiators using live steam is no hotter than from one using exhaust steam, the greater amount of heat which was originally in the live steam must have been given up in the radiators, or as line losses. Of course, if the steam passes through the supply mains at a higher temperature there will be greater line losses. However, the properties of exhaust steam are not dependent upon the fact of whether it has passed through a reciprocating engine, a turbine or a reducing valve, and if the same amount of steam is used in the same condition it must contain the same amount of heat in all cases. For the same temperature and pressure, steam will only differ in the amount of moisture which it may contain, and in any case it is quite sure to be in a saturated condition before it proceeds very far along the supply mains.

It must be self-evident that if a portion of the heat contained in a given quantity of steam is transformed into mechanical work, there will be less heat remaining in the steam which is available for other purposes. This is a case where it is not possible to eat your cake and have your penny also.

To settle this question to the satisfaction of all, it is evidently necessary to accumulate data from different series of test runs in which all conditions of operation are perfectly well known and recorded, and the accumulation of such test data is greatly to be desired. The National District Heating Association has already done good work in collecting data and constants applying to both hot-water and steam heating conditions, and in collecting information as to different practices of construction and operation of heating systems. There is a great deal of this work that could with profit be standardized, and the efforts of the Association will no doubt aim at this.

Semi-Annual Meeting of Northern White Cedar Association.

The Lake of the Woods, on the northern border of Minnesota, separating the United States from Canada, has been selected by the Directors of the Northern White Cedar Association as the place for the semi-annual meeting combined with fishing and outing trip.

A special private sleeping car will leave Minneapolis on the Northern Pacific "Lake Superior Limited" at 2 p. m. June 25. At West Duluth this car will be attached to the Winnipeg train of the Canadian Northern and will be set out at Beaudette, Minn., at 4:30 a. m. on the morning of June 26. Breakfast will be had at Beaudette and immediately thereafter the party will take launches down the Rainy River, fourteen miles to the Lake of the Woods. Ample and comfortable provision will be made at the lake for sleeping, eating, fishing, etc. The party will stay at the camping place until Tuesday morning, June 29, then returning to Beaudette by boat to look over the cedar industries there in the afternoon and leaving Beaudette on a special sleeper for Duluth and Minneapolis on Tuesday evening.

It is the purpose of the committee in charge to keep the expense of this trip as low as possible. The committee believes that the Lake of the Woods will be a revelation to those who are not familiar with its grandeur. T. M. Partridge, Lumber Exchange, Minneapolis, Minn., is chairman of the outing committee.

Safety Conference Postponed.

On account of unavoidable delay in meeting the demands for Circular No. 54, containing the proposed National Electrical Safety Code, the Bureau of Standards has postponed the conference called to meet in Washington on July 1. In order to permit the fullest opportunity to study and criticize the proposed rules, the conference will not be held until October 27.

Summer Course for Business Men.

Kentucky State University has just announced a course of study of electricity for business men, to begin on June 14 and end on August 7, classes to be held between the hours of 11 a. m. and 12 m. The fee for the eight weeks will be $15 and the lectures will be given by W. E. Freeman, professor of electrical engineering.

Meeting of Pennsylvania Contractors.

The fourth annual convention of the Electrical Contractors' Association of Pennsylvania will be held at the Hotel Adelphia, Philadelphia, on June 16. The first session will open at 10:30 a. m.

Jovians Working for Rose Festival.

The Jovian League of Portland, Ore., is making an attempt to have all the electrical dealers in Portland participate in the electrical parade, held in that city during the Rose festival, under the direction of the Jovian League.

The principal Jovian float, according to plans, will be decorated in a manner symbolic of the order, with a cauldron, anvil and the like, as well as a number of Jovians in regalia. It is estimated there are 28 electric automobiles in the city, and earnest efforts are being made to have all of them in the procession. If possible all the electric auto trucks in the city will be entered with floats. Illumination of the marching bands by electric-lighted dusters will also be attempted. F. W. Hill is chairman of the General Committee for the Jovian League.

Pennsylvania Railroad Electrification.

The suburban electrical service on the main line of the Pennsylvania Railroad has been postponed until July 1. Officials of the railroad announced that it was impossible to complete the electrification of the road in time to begin service as announced. After the new system is working it is the intention to electrify the branch line from Philadelphia to Chestnut Hill.

Annual Meeting of New York Electrical Society.

The annual meeting of the New York Electrical Society will be held at the Hotel Martinique, Broadway and Thirty-second Street, New York City, on Tuesday, June 15, at 8:30 p. m. At this meeting the election of officers for the ensuing year will be held. The following nominations have been made: President, Elmer A. Sperry; vice-presidents, George W. Elliott, S. N. Castle and Bernhard Hoffman; secretary, George H. Guy; treasurer, Henry J. Hoeltge. After the business session there will be a smoker and entertainment.

Examination for Illuminating Engineer.

The United States Civil Service Commission announces an open competitive examination for illuminating engineer to be held on July 7 and 8 at the usual places, for filling a vacancy, at $1,200 per annum, in the office of the supervising architect at Washington, D. C., and similar positions as occasion may arise. This examination supersedes that for electrical engineer which was announced in our issue of May 29 and which was to have been held on June 23 and 24. Competitors will be examined upon the same subjects, however.

Electrical Prosperity Week Sectional Committees Appointed.

Sectional committees to supervise the nation-wide electrical prosperity campaign in every state of the union have been appointed by the executive committee of "Electrical Prosperity Week." Nearly 200 of the leading electrical men of America, representing all the interests of the electrical industry, have been invited to take charge of local campaigns.

These committees, co-operating with the Society for Electrical Development, will then designate additional committees in small cities and towns in the respective districts so that by the time the campaign gets in full swing about August 1, more than 60,000 of the nation's electrical business men will be engaged in a common effort to sow the seeds of courage and confidence in the United States, its institutions and its business men.

Pledges have been received at the executive offices of the society in New York City, from the leading industries in other fields that the electrical industry can be assured of their support. City officials have written the society and pledged co-operation in the "white way" movement.

The Jovians are particularly aggressive in the campaign work.

The society will issue before July 1 a prospectus of the campaign and all proposed plans. It will contain 20 pages of interesting matter and will explain how all interests can participate to their mutual advantage.

Lynn Section Officers.

The election of officers of the Lynn Section, American Institute Electrical Engineers, occurred May 27, and resulted as follows: Chairman, Guy N. Chamberlin; secretary-treasurer, F. S. Hall.

There is a present membership of 550, of whom 92 are members of the national body. The average percentage of attendance at the meetings the past season was 53, an increase over any former year. Seventy-two new members came in this year, and a reserve fund of nearly $2,000 has been secured which will be used in promotion of the Section's interests, and it is planned to have speakers of national prominence deliver lectures.

As a fitting close of the season's lectures, W. L. R. Emmet, of Schenectady, gave a talk on "Ship Propulsion" on May 27. A clear historical summary leading up to the present state of the art was given, and while on small vessels the value of electrical propulsion is not so marked, it was shown how superior it is on such a vessel as the battleship *California*, which is to be supplied with turbines and motors.

National Electric Light Association.

Complete Report of Thirty-Eighth Convention, Held at San Francisco, Cal., June 8 to 11 — General, Commercial, Technical, Accounting, Hydroelectric and Public Policy Sessions.

(By Telegraph.)

The thirty-eighth convention of the National Electric Light Association was held at San Francisco, Cal., June 8 to 11, inclusive. A number of special trains brought the delegates to the Pacific Coast by different routes, and Monday, June 7, found most of them registered at the registration booth in the convention hall. Hotel headquarters were at the St. Francis. The circumstances of the convention were unique, in that it was held in conjunction with the Panama-Pacific International Exposition. The exhibits of the latter took the place of the exhibits usually held in connection with the convention.

A full report of the various sessions of the convention is given herewith. Abstracts of the various papers and committee reports which were presented at the convention will be found on pages 1107 to 1113.

Opening General Session.

The convention was called to order in the capacious auditorium of the building of the Native Sons of the Golden West, San Francisco, Cal., at 10:00 a. m., on Tuesday, June 8, by President Holton H. Scott. Mr. Scott introduced James Rolph, mayor of the city of San Francisco, who delivered a very cordial and eloquent address of welcome. The mayor paid particular tribute to John A. Britton, chairman of the Local Convention Committee, to whose energy and prodigious efforts the very complete arrangements for the comfort and edification of those attending the convention were largely due. Mr. Rolph complimented and congratulated the visiting electrical men upon the accomplishments which have been achieved in their industry, and spoke at some length regarding the large part which electricity was playing in the development of the cities on the Pacific Coast, and especially with reference to the spectacular features of the illumination of the grounds of the Panama-Pacific International Exposition.

President Scott then delivered the annual presidential address, in which he called attention to the important part that electrical men have taken in working out the problems involved in the construction and operation of the Panama Canal and the contribution which they had made to the development of the Panama-Pacific International Exposition. It was particularly appropriate that the convention of the National Electric Light Association should be held in San Francisco this year. California is the leader in the development of hydroelectric energy. In that state there is now being developed 720,000 horsepower, and in the three Pacific states, California, Oregon and Washington, there is altogether a development of over 1,000,000 horsepower. California alone contains a length of transmission lines in excess of 1,500 miles.

Referring to the membership of the Association, Mr. Scott said that although there had been an increase in the dues of Class A and Class D members, there had, nevertheless, been a substantial development. After giving careful consideration to the subject it had been decided to base the dues of Class D members upon their mercantile ratings, with a minimum annual fee of $20. There have been only a few withdrawals on account of this change, and it is expected that there will be such an appreciation of the value of membership in the Association that there will be no hesitation upon the part of the large majority of manufacturers to pay the increased dues. The company section membership has been steadily increased until there are at the present time 9,000 such members.

An accounting section is to be organized at this convention, and it is hoped to also establish in the near future a manufacturers' section, and to re-establish the hydroelectric section which was abandoned last year as a separate organization and the sessions dealing with this subject consolidated with the technical sessions. The National Electric Light Association has endorsed the plan which is being promoted by the Society for Electrical Development for an Electrical Prosperity Week.

Mr. Scott complimented Secretary T. C. Martin upon the report of the Committee on Progress which he had prepared, making especial reference to the analysis and conclusions regarding municipal ownership of public utilities and the operation of municipally owned plants. He gave a brief review of the industry during the period of the organization of the Association, and told how the various matters which have come up for discussion have been evolved. Even under the unstable conditions of business in general, and in the face of a great increase in the efficiency of electrical apparatus and particularly in the sources of illumination, the central-station companies have shown substantial gains in business, which have been continued during the past year. It is to be hoped that the public will appreciate its dependence upon the public-utility corporations for an indispensable service which is rendered under conditions of extreme economy, and that the public will be disposed to render a fair return for these services.

The report of the Committee on the Organization of the Industry was, in the absence of the chairman, George Williams, read by S. A. Sewall. The present membership of the Association is as follows: Class A members, 1,125; Class B members, 11,125; Class C members, 96; Class D members, 253; Class E members, 808.

The secretary's report, which was presented by T. C. Martin, showed a substantial gain in reserves, and indicated that a vast amount of work had been undertaken and carried out by the executive officers of the Association. There were sent out from the New York office an average of 300 letters for every day in the year. The amount of literature in the shape of bulletins and handbooks was enormous, there being distributed 150,000 copies of the monthly *Bulletin* alone. The Lecture Bureau has done an immense amount of work also, and there are now available 35 lectures, illustrated with 1,400 lantern slides and two motion-picture films. The lectures have already been heard by over 40,000 members of the industry in 55 different cities and 25 states. Information on rates is being constantly gathered, and the available data on this subject augmented. There is every indication that this service is highly appreciated. Notwithstanding the distance of the convention city from the executive headquarters, complete arrangements for the convention had been made in plenty of time, due largely to the splendid co-operation of the local committee in San Francisco. The report complimented the chairmen of the various committees for their exceptional zeal in preparing their reports early and their promptness in making them available for publication prior to the convention. The report also called particular attention to the stability of the industry as a whole. Regarding efficiency of the administrative department, Mr. Martin showed that while

the work had been larger than ever before, it had been carried on without any increase in expense, and in some instances with a curtailed force. As usual the report concluded with a cordial expression of thanks to the members of the executive offices of the organization.

The report of the insurance expert, which had been prepared by William H. Blood, was then, in his absence, read by Thomas Sproule.

Secretary T. C. Martin then gave a brief abstract of the report of the Committee on Progress. This was followed by the report of the Committee on the Question Box, which was presented by S. A. Sewall. With respect to the revision of the Question Box the committee recommended that the idea of revision be given up for the time being, and that if it was necessary to consider it in the future the work might be done at the executive headquarters.

The report of the Committee on Relations with Educational Institutions was presented by John F. Gilchrist. Mr. Gilchrist brought particularly to the attention of the delegates the fine spirit of co-operation which had been manifested by the college representatives, particularly in the engineering branches. It is important that students of today should have a proper and fair idea of corporation opportunities and difficulties, and that opinion should be molded at this time, particularly in view of the anti-corporation propaganda being taught in many institutions of learning.

A paper by Paul Lüpke entitled "Revivals," was then read by Secretary Martin. This closed the first session of the convention.

First Technical Session.

The first technical session was held on Tuesday afternoon, with President Scott in the chair and W. C. L. Eglin acting as vice-chairman. The report of the Committee on Meters was presented by C. G. Durfee, chairman of the committee.

In discussing this report, Otto A. Knopp, of San Francisco, expressed the opinion that the use of oil with sapphire bearings, except upon instruments handling a large amount of energy, introduced disadvantages which were worse than rough jewels. He advocated the use of cut-diamond bearings except on instruments carrying very small loads.

J. F. Vaughan, of Boston, emphasized the importance of operating companies looking upon the Meter Committee as a body which was available to assist them in solving meter problems, and whose function it was to keep the industry posted upon the rules and regulations regarding meter practice. Steps should be taken to have public service commissions in the various states depend upon the Meter Code of the National Electric Light Association as a guide.

The report of the Committee on Electrical Apparatus was presented by J. P. Jollyman. The discussion of this report was opened by J. F. Kearney, who suggested that representatives of the member companies should carefully read that section of the report relating to service requirements of motors, and they should co-operate to the fullest extent with the next committee.

E. P. Dillon, of Pittsburgh, said that if operating companies made a close study of the suggestions of the committee, operating conditions would readily become standardized.

The report of the Committee on Grounding Secondaries, of which Paul Spencer is chairman, was presented by Thomas Sproule. Resolutions were then adopted recommending that the incoming committee should investigate the operation and testing of high-tension insulators, sub-committees to be organized to investigate special conditions in the various sections of the country.

H. B. Gear then presented a paper entitled "Application of the Diversity-Factor." There was no discussion of this paper.

W. D'Arcy Ryan then made an address upon the lighting features of the Panama-Pacific International Exposition, which was beautifully illustrated with colored lantern slides.

First Commercial Session.

The first Commercial Session was called to order by Vice-President L. D. Gibbs, of Boston, Mass., and Chairman Douglass Burnett was introduced. E. A. Edkins, of Chicago, presented the report of the Finance Committee. J. G. Learned, of Chicago, presented the report of the Membership Committee.

E. A. Edkins presented the report of the Publications Committee, adding that five thousand copies of N. E. L. A. booklets have been sold since printing the report. Mr. Edkins then presented the report of the Subcommittee on Salesmen's Handbooks, indicating a gratifying sale of these publications.

T. I. Jones, of Brooklyn, N. Y., opened the discussion on the report of the Committee on Publications, commending the house-wiring literature published by the Section. This is being used with tremendous success by many companies.

Frank H. Gale, of Schenectady, N. Y., also endorsed the work of the committee and urged that companies make suggestions or criticize the literature if it does not meet with their approval, or explain why it is not more extensively used.

J. G. Learned, of Chicago, stated that five years ago the Public Service Company of Northern Illinois had a mailing list of 6,500 prospects, and while an average of 1,500 houses are wired annually, at the present time the company has a list of 9,500 prospects. So far this year eighty per cent as many houses have been wired as during the whole of 1914. Considerable of this business is attributed directly to Association literature.

L. D. Gibbs, of Boston, pointed out that the booklets of the Association are adapted to the smallest as well as to the largest communities; he cited a company in Massachusetts which ordered only thirty booklets. In using syndicate literature, however, he cautioned that the personal element should not be neglected.

M. C. Osborn, of Spokane, Wash., stated that two thousand houses were wired last year as a result of personal solicitation supplemented by extensive distribution of literature. He asked how prospects are secured by the Public Service Company of Northern Illinois. Mr. Learned explained that these were secured by a canvass made by salesmen.

N. H. Boynton, of Cleveland, thought that the same effort necessary to produce booklets by individual companies could be much more profitably spent in properly distributing and utilizing Association literature.

Douglass Burnett, of Baltimore, called attention to the practice of the Consolidated Gas, Electric Light and Power Company in not discontinuing service when a customer leaves the premises. A suitable tag is left in a conspicuous place, to be filled out by the new tenant, which is considered, when signed, as an application for service. The company experiences very little loss. He urged that literature be sent to tenants in houses which are wired, but not using service.

The report of the Committee on the Education of Salesmen was presented by F. R. Jenkins. J. F. Gilchrist, of Chicago, discussed this report, endorsing the idea of having the Association undertake educational work. He elaborated on the value of instruction received from those actively engaged in central-station work.

R. S. Orr, of Pittsburgh, felt that good power salesmen are hard to find and some special educational effort should be extended to train men for this particular field.

E. L. Callahan, of Chicago, thought that this form of educational work for central-station employees should appeal particularly to the small companies not able to hold employees' schools.

R. R. Young, of Newark, N. J., spoke of the success experienced by the Public Service Electric Company in educating employees; class leaders are appointed to conduct various classes. Employees of the company in all departments are eligible for instruction.

S. M. Kennedy, of Los Angeles, explained that educational meetings are held weekly by the Commercial Department of his company on the company's time. He thought that correspondence courses as proposed should be of great benefit in supplementing these regular meetings.

S. P. Pitts, of San Francisco, saw no reason why the proposed Association course should not be as successful as the well known private correspondence schools. The Association has a great advantage in being able to call upon the leaders in the industry to prepare instruction work.

F. A. Leach, of Oakland, Cal., said that weekly meetings of employees of the Sales Department are held, at which lectures are presented and papers read on pertinent topics. Employees are impressed with the idea that their promotion will be as rapid as their fitness warrants.

R. L. Lloyd, of Philadelphia, explained the educational work being undertaken by the Philadelphia Electric Company. The curriculum is so arranged that office boys, clerks and other minor employees can prepare themselves for better positions.

J. G. Learned, of Chicago, then presented the report of the Committee on Terminology. There was no discussion of this report.

Second Commercial Session.

President H. H. Scott called the second commercial session to order on Wednesday morning and introduced C. C. Moore, president of the Panama-Pacific International Exposition, who delivered a very cordial address of welcome. The opening of the technical and accounting meetings was delayed in order to permit all delegates to attend this feature of the program. Mr. Moore commented on the many obstacles which had to be overcome in going ahead with the plans for the exposition due to the business depression resulting from the European war. He spoke of many features which distinguished this exposition from previous affairs, laying particular stress on its lighting effects and its liberal utilization of electrical energy. The entire exposition is a great electrical exhibit on a scale more elaborate and comprehensive than ever before attempted. A tribute was paid to W. D'A. Ryan, who was chiefly responsible for the lighting effects and to John A. Britton and other officials of the Pacific Gas and Electric Company, who contributed so much to the success of the exposition.

Following this address, E. L. Callahan took the chair and the report of the Power Sales Committee on typical power sales development in the West was presented by J. H. McDougal. C. H. Stevens, Brooklyn, N. Y., opened the discussion by commenting on some general features of the power business in the West. He inquired as to the load-factor of sugar refineries and the pressure maintained in the boilers. Mr. McDougal replied that the load-factor averages 60 per cent for ten months. The refineries close two months each year. In one large plant using 1,700 horsepower, live steam at 110 pounds pressure is used exclusively. Experience shows that a superior grade of sugar is made by using live steam in preference to exhaust steam, hence central-station service costs compare favorably with those of isolated-plant operations.

C. I. Weaver, Jackson, Mich., referred to beet-sugar factories in the Michigan district which operate on an average of only three months per year, October, November and December. Large quantities of water are used for washing and conveying beets and the pumping load is a large item. Pumps operate 24 hours per day.

J. G. Learned, Chicago, Ill., inquired as to what effect the electric dredging load had on regulation. Mr. McDougal replied that the diversity-factor of dredges in districts where many are used is extremely good and regulation is not affected; in isolated cases dredge operation affects the regulation.

R. L. Lloyd, Philadelphia, Pa., called attention to desirable characteristics of ice-making load and inquired whether this business obtains to any extent in the West. Mr. McDougal stated that this business is growing rapidly and considerable data respecting it will be available shortly.

S. M. Kennedy, Los Angeles, Cal., stated that there are several beet-sugar refineries in Southern California which are using central-station power. Characteristics of this load are such that they fit in with the companies' business and form an admirable load. The period of operation, however, covers a longer time than in the case of eastern refineries.

The report of the Committee on Merchandising and Recent Developments of Electrical Appliances was then presented by R. R. Young. C. N. Stannard, Denver, Colo., opened the discussion by calling attention to the desirability of using a card system for indicating the condition of appliance business. Prospect cards can be compiled as the result of a canvass by salesmen and an exact record kept of sales. He also spoke in favor of meetings of salesmen which should be held every morning before the men start on their daily work. Mr. Stannard also believes that salesmen should be paid good salaries so that they are not constantly worrying relative to personal financial conditions and can devote their entire time and thought to company business. He also said that salesmen should be vitally interested in the revenue of the company by being paid a commission or bonus on the amount of revenue their individual efforts produced.

J. G. Learned, Chicago, Ill., spoke of the importance of industrial electric heating and recommended that further investigation be carried on by the committee in this direction.

W. W. Briggs, San Francisco, Cal., held that the central station should refrain from any reference to cut prices in connection with appliance sales. Companies should co-operate with the manufacturers and dealers in maintaining prices, providing they are equitable, and thus gain the co-operation of these interests and at the same time making for automatic reductions as sales increase.

M. O. Dellplain, Syracuse, N. Y., endorsed Mr. Briggs' contention that price cutting should be abolished. He stated that it was the intention of the committee to eliminate any reference to this and he thought it only a question of time before all price cutting by central stations will be abolished.

H. O. Loebell, New York, spoke enthusiastically regarding the possibilities of industrial electric heating; he

thought that central stations are confronted with as great an opportunity in exploitation of industrial heating as was true when motors and lamps were first developed. He claimed that fuel oil can be replaced by electric heating despite the extremely low cost of the former. Although the thermal efficiency of electric heat is much higher than heat produced by fuel oil, the greatest advantage of electric heat is that the total cost of production is lessened because of superior product and fewer failures. He referred to a 6,500-kilowatt installation recently made in Toledo.

M. C. Osborn, Spokane, Wash., stated that his company serves 18,000 residence consumers. Due to the constantly reducing rates the average revenue per consumer has decreased proportionately, but recently appliances have increased the consumption and for April, 1915, the average per consumer was 17.5 kilowatt-hours.

O. Hogue, Chicago, Ill., explained that in order to keep up the revenue from residence consumers, it is necessary to promote appliance campaigns actively. In a recent campaign in Chicago, during which 1,000 irons were sold in 60 days, regular sales of the appliance department showed no decrease. The Commonwealth Edison Company is using its lighting salesmen to introduce and sell appliances. Mr. Hogue also referred to many fields for special applications of electric heating.

R. R. Young, in closing the discussion, stated that in Newark, N. J., salesmen are stimulated to greater effort by comparing their weekly sales records with the corresponding week of the previous year. He endorsed the discussion relative to abolishing price cutting and regretted that this matter had not appeared in the committee's report. He also felt that there is an enormous field for large industrial heating business, but small installations should not be neglected, as often the revenue from these is greater than from the large installations.

Third Commercial Session.

W. W. Freeman, Cincinnati, O., presented the report of the Lamp Committee at the third session of the Commercial Section on Wednesday afternoon. Discussion was opened by C. L. Law, New York, who described an installation of 15 100-watt type C Mazda lamps in blue-tinted bulbs and the same number of white-bulb lamps in two adjacent show windows. Tests indicated that 25 per cent more light was given off by the white-bulb lamps. Lantern slides were shown of two different windows.

J. W. Howell, Harrison, N. J., commented on some early experiences in promoting the use of nitrogen-filled tungsten lamps. Trial lamps were installed in New York City before the present installation was made; the life of these trial lamps was much shorter than expected, but the installation was made and records now show a life greatly in excess of manufacturers' guarantee. He thought the introduction of specifications into lamp selling has been the greatest incentive to manufacturers in improving product. Lamps are on the market which are inferior in grade, usually having about one-third the life and efficiency of standard lamps. To protect customers, central stations should buy lamps on specifications subject to tests. All large lighting companies buy lamps in this way and many companies other than central stations also buy lamps subject to tests.

J. F. Gilchrist, Chicago, Ill., thought that lamp salesmen should refrain from proclaiming the higher efficiency of new lamps until central-station conditions have been adjusted to meet the new situation.

S. E. Doane, Cleveland, O., called attention to some of the improvements which are being made in the nitrogen-filled tungsten lamps, particlularly in regard to larger bases, thus reducing the heating effect. In answer to Mr. Gilchrist he called attention to the fact that this is the only civilized country in which the great economy of nitrogen-filled lamps has not been widely advertised.

L. A. Coleman, New York, stated that 300 and 400-watt multiple lamps of the nitrogen type have been installed in New York City with good results. Considerable money is being saved in inspection and maintenance over that previously required with arc lamps. The life of these lamps averages 1,000 hours. The city is now negotiating with the central-station company for the installation of a considerable number of 200-watt lamps to replace gas lights on many side streets. An initial installation of 500 of these small units will be made. Mr. Coleman said the United Electric Light & Power Company, of New York City, on May 1 discontinued the practice of free renewals, but lowered the rate and made an additional rate of one-half cent per kilowatt-hour for lamp renewal. No results of this new policy are yet available.

W. H. Rolinson, New York, presented several curves showing the performance of type C Mazda lamps.

P. S. Millar, New York, stated that there is no longer experienced any difficulty with multiple lamps of the nitrogen type. He thought that new lamps should not be limited to burning in the pendent position as this restricts their use. Relative to lamps with blue-tint bulbs, Mr. Millar feels that there is no particular field for these lamps, as the same results can be obtained by using a color filter and the expense is then much less. He admitted, however, that there is considerable need for white light for color matching and other special services. He also thought there was no necessity for further development of the concentrated-filament gas-filled lamp.

Douglass Burnett, Baltimore, Md., spoke of lamp voltages and the danger of their standardization to too great an extent. He proposed that three classes of voltages be standardized and labels of different colors be used by manufacturers to indicate these classes of voltages. With this scheme in use central stations could properly advise customers which type of lamp to use, thus insuring lamps coming closely within the limits of the voltage of the circuit.

T. I. Jones, Brooklyn, N. Y., referred to the experiences of the Brooklyn Edison Company with 1,000-watt type C Mazda lamps. A unit was designed to contain a 1,000-watt lamp suitable for outdoor service and an extensive campaign was carried on to place these units in service. Free renewals were given. Mr. Jones stated that burnouts were so frequent that the company discontinued promotion of this equipment. Recently the Brooklyn street-lighting system has been changed by new city officials in order to reduce the cost and all direct-current arcs have been replaced by 300-watt type C Mazda lamps. At present 2,000 are installed. Gas lamps are also being replaced by these 300-watt lamps. Mr. Jones spoke of lamp-renewal policies, stating that there were two sides to the question and local conditions must govern each decision as to the proper policy to adopt.

T. I. Jones then presented the report of the Committee on Wiring of Existing Buildings. S. E. Doane, Cleveland, O., opened the discussion of this report by pointing out some difficulties met by the committee in getting any new systems of wiring tried here. R. S. Hale, chairman of the committee, finally succeeded in obtaining the permission of the Boston inspector of wires to allow a trial installation of the concentric-conductor system.

H. R. Sargent, Schenectady, N. Y., displayed samples of concentric wire, such as is being made in this country

closely following European practice. The General Electric Company is at present making tools and dies to facilitate simple and easy installation of the concentric system. Mr. Sargent said a set of suitable fittings for this system will be available in about three months and central stations can then endeavor to try out the new system locally. He felt that if the material were properly installed and carefully grounded, it will be entirely safe. Regarding attachment plugs, Mr. Sargent reported that in the course of a year 90 per cent of all plugs made will be interchangeable.

E. W. Lloyd, Chicago, stated that there is no desire on the part of the central-station men to reduce the cost of wiring at the expense of safety, but all should be vitally interested in any new system which will permit central stations to obtain business that is now impossible because of prohibitive cost of wiring and furnishing service. The Commonwealth Edison Company has wired (as an experiment) a six-room house with Stannos wire, using standard fittings which were adapted for installation by the Edison Company. From this installation the company is convinced that the cost is materially less than with the standard system. Mr. Lloyd considers the subject of concentric wiring of vital interest and urged careful consideration of the subject.

Second Technical and First Hydroelectric Session.

The second technical and first hydroelectric session was held on Wednesday morning, with H. A. Wagner as chairman, and W. C. L. Eglin as vice-chairman. In the absence of M. R. Bump, chairman of the Hydroelectric and Transmission Committee, the report of that committee was presented by P. M. Downing.

The report of the Committee on Hydroelectric and Transmission Progress was presented in abstract by T. C. Martin. In discussing this report Mr. Martin said that an interesting contribution to the subject was in the shape of a treatise by Dr. Swayne, which had been published by Yale University under an endowment fund. An interesting part of this volume was that it indicated Dr. Swayne's endorsement of the indeterminate form of franchise.

The report of the Committee on Prime Movers was, in the absence of I. E. Moultrop, chairman of the committee, presented by O. B. Coldwell, of Portland, Ore.

The discussion of this report was opened by W. D. Peaslee, who presented some interesting written discussion by Professors Rosenkranz and Allen, of the Oregon Agricultural College, on the problem of measuring stream flow. They introduced a very interesting method of using a salt solution in connection with an indicating voltmeter. This furnished a direct determination. Mr. Coldwell also contributed to the discussion, describing the use of the salt solution with a series of screens and curve-drawing instruments.

Philip Torchio, of New York City, called attention to the use of economizers, and gave his opinion that a gain of eight per cent could be made in fuel economy by their use. In this country, however, the entire equipment would have to be designed in order to get the most out of the economizer and to get effective work from the auxiliaries. With new stations the use of economizers with stacks employing motor-driven blowers entering into the stack in a manner similar to steam-injector practice, would make for economy. He also called attention to the general use in the municipal station at Paris, France, of direct-current generators mounted directly on the turbine shaft, one for excitation and one for furnishing energy for motors driving auxiliary apparatus.

J. A. Lighthipe, of Los Angeles, said that at the Long Beach station of the Southern California Edison Company the new boilers and turbine equipment were fitted with steam-flow meters, carbon-dioxide recorders, instruments for measuring draft and oil fuel both for quantity and temperature, and that with equipment of this character it was not difficult to maintain efficiencies and to continue the results obtained in tests made by laboratory experts. The economy in this station is very high, under particularly advantageous conditions running as high as 300 kilowatt-hours per barrel of oil. A point to which he called particular attention was the matter of not capitalizing the overall economy of a turbine for too long a period of time, as rapid improvements in turbine efficiency renders the apparatus comparatively inefficient or actually obsolete within six or seven years, so that it is better to install new machinery and keep the old equipment for emergency service. Operators on the Pacific Coast have a big advantage over operators in the eastern part of the country because of the high heating value of the available oil, the facility in handling and storage, and the avoidance of any necessity for the removal of ashes. The next big step in securing greater efficiency and low cost of operation on the Pacific Coast will probably be the use of natural gas.

J. P. Jollyman then presented a paper entitled "Practice in High-Head Hydraulic Plants."

This was followed by a paper by E. D. Searing, entitled "An Analysis of Water-Wheel-Governor Effort."

C. H. Delany then presented a paper on "Oil-Burning Stand-By Plants."

These three papers were discussed in conjunction with the following one by P. M. Downing entitled "Western Hydroelectric Transmission Developments."

Mr. Downing's paper consisted of a handsomely illustrated book, giving a general review of the whole subject. It included illustrations, a relief map and supplementary information contributed by Pacific Coast power companies as a souvenir of the Pacific Coast to the convention delegates.

Third Technical and Second Hydroelectric Session.

The second hydroelectric and third technical session was held on Wednesday afternoon. H. H. Scott was chairman and O. B. Coldwell was vice-chairman. The report of the Committee on Overhead Line Construction was presented by Thomas Sproule. Then followed a paper on "Electric Line Distribution Conditions in the Northwestern Pacific States," by J. C. Martin. The report of the Hydroelectric Sub-Committee on High-Tension Transmission and Construction was presented by R. J. McClelland. These three papers were discussed together.

President Scott announced that the Executive Committee had unanimously approved of the conference of the Overhead Line Construction Committee and a committee to be appointed from the Pacific Coast.

The meeting was then turned over to W. C. L. Eglin as chairman, who delivered a vigorous address relating to the necessity of electric light and power companies making a definite study of overhead line construction requirements so that complete information might be available and unnecessary compromises eliminated in the formulation of rules in the future.

J. E. Kearns, of Schenectady, N. Y., moved that the section of the committee report referring to the location of lightning arresters in connection with transformers be changed so that the

arrester may be mounted on the same pole on which a transformer is located. He read a list of large power companies now adopting this as standard practice. The motion was adopted. Mr. Kearns also spoke regarding the advisability of having duplicate committees under the direction of each local section so that all matters considered by the general committee might be referred to local sub-committees for counsel and advice.

A. J. Bowie, Jr., of San Francisco, criticized certain sections of the report because the burden of improvements and changes was put on power companies, and made the communication companies arbiters of changes which might be necessary. He also criticized discrimination against air switches in favor of oil switches, claiming that this was not supported by scientific tests. He enumerated instances which would indicate that the belief that there are heavy transitory currents with air switches is erroneous.

F. H. Woodward showed that the Overhead Line Construction Committee had very much benefited the position of power companies and that this committee had not made recommendations which threw the burden of improvements upon power companies alone. Expenses would be shared equally by communication companies as well. He said the recommendation with regard to oil switches was made because air switches take a longer time to break the arc and this interval brings about conditions of unbalance.

Mr. Bowie replied that the air-break switch reduces the current just before disruption and then reduces the hammer blow not only to its own line, but to any adjacent circuit.

C. B. Babcock said that the committee had not legislated against air-break switches and that if air-break switches did not produce disturbances under specific conditions, they might be installed.

Philip Torchio, of New York City, said that general statements were misleading and that as between oil-break and air-break switches there were conditions where one was better than the other, but that each had its advantage where properly installed to meet line conditions and the characteristics of the service.

W. D. Peaslee, of Corvallis, Ore., showed how conformity to some recommendations of the committee in building a transmission line in the Northwest, which experience in that locality had indicated were unnecessary, had imposed a burden of $4 per person served.

Harold Goodwin, Jr., of Philadelphia, suggested careful investigation of reasons for changes set forth by engineers of communication companies, as it would often be revealed that even they were not properly informed with regard to phenomena underlying inductive disturbances.

L. M. Klauber, of San Diego, said that the important event of this meeting was the recognition by eastern operating men of the difference in the conditions of western requirements. The tendency has been apparent to believe that western construction was cheap and therefore flimsy. Investigation had proved that it was absolutely necessary under western conditions to use long spans and narrow spacing, complying with every rule of safety.

Mr. McClelland stated that further recommendations of the Overhead Line Construction Committee would eliminate a great many specifications under criticism.

A telegram from Dr. Edward B. Rosa, of the National Bureau of Standards, was read at this point, announcing the postponement of the conference for drafting a National Electrical Safety Code at Washington, D. C., from July 1 to October 27.

The report of the Hydroelectric Sub-Committee on High-Tension Apparatus and the report of the Hydroelectric Sub-Committee on Main-Line Electrification of Railroads were then read. J. E. Kearns moved that the Hydroelectric Sub-Committee on High-Tension Apparatus and the Electrical Apparatus Committee co-operate with respect to the preparation of any recommendations or other information of value to the industry. This motion was carried.

Fourth Commercial Session.

H. A. Wagner, Baltimore, Md., presided at the fourth commercial session, which held on Thursday morning. The report of the Rate Research Committee was presented by E. W. Lloyd, Chicago, Ill.

J. E. Kearns, Schenectady, N. Y., opened the discussion by pointing out that the kilowatt-hour rate is confusing to residente customers; he proposed, at least for appliance business, a rate based on the average consumption of various appliances for a given period, this being a charge which would be stated directly in an amount of money that could be added to the regular lighting bill.

B. E. Hannon, Sacramento, Cal., stated that the flat rate for lighting has been in use for some time in that city, the income to the company averaging approximately 1.5 mills per kilowatt-hour. The city authorities have prevented the company from changing the customers over to the meter rate and the case is now in the courts.

H. W. Peck, Schenectady, N. Y., said that the more devices that are placed in residences the fewer complaints there are relative to high bills.

George B. Johnson, Chicago, called attention to the unsatisfactory experience of the Commonwealth Edison company with flat rates. He agreed with Mr. Peck that the more appliances there are in use in the home the greater is the opportunity to convince customers that bills are justified.

S. M. Kennedy, Los Angeles, Cal., asked if it were considered proper for a company to take on a large power business of high load-factor at a rate lower than the average switchboard cost.

E. W. Lloyd, Chicago, in reply to Mr. Kennedy, referred to the efforts of the Commonwealth Edison Company to secure business of large ice manufacturers. Careful analysis was made of all the conditions and it was found the business could be secured at a rate of one cent per kilowatt-hour. Because of its high load-factor and off-peak characteristics, the business was taken on with gratifying results to the company. He believed that where the acquisition of high-load-factor business will lower the overhead costs the business should be taken even at a rate apparently lower than switchboard cost.

W. W. Freeman, Cincinnati, O., explained that the cost of producing energy at the switchboard is an average cost made up of many items. Current can be sold at a low unit rate apparently below this average cost and still not be below the minimum cost. He stated that in many instances the acquisition of large blocks of power business at high load-factor is exceptionally remunerative even at rates below average costs.

T. I. Jones, Brooklyn, N. Y., cited the case of a large isolated plant which was generating energy at a cost lower than the central-station rate. By adjustment of the labor schedule so that plant closed at 4:30 p. m., the central station was enabled to make an off-peak rate sufficiently low to attract the business. The rate, while lower than the switchboard cost, has reduced the average cost to a point where this business is extremely profitable.

Arthur Williams, New York, stated that it does not necessarily follow that an increment cost bears any direct relation to the switchboard cost. Rate schedules should be arranged to attract the very largest as well as the smallest customers. No central station escapes large loss on the very small customers, but still the public cannot see why distinction should be made in rates. He said 90 per cent of the overhead cost is chargeable to the

small customer. He urged segregation of classes of business in such manner that the public will be able to determine the essential differences between the various classes.

J. F. Gilchrist, Chicago, stated that central stations are usually agreed on the fundamentals of rates and rate-making, but in superficial details there is much diversity of opinion. This condition gives commissions an opportunity to consider the rates of a company as an individual effort of its manager, although, as matter of fact, there is the same common basis of rates throughout the country.

H. Almert, Chicago, explained a case which came before the Wisconsin Railroad Commission, where a central station was permitted to take on business at a rate below the average cost and as a result reduced its overhead to such an extent that a general reduction in rates could be made.

The report of the Power Sales Bureau was then presented by C. H. Stevens. J. E. Kearns, Schenectady, N. Y., presented the paper of C. W. Bartlett entitled, "The Commecial Application of Resistance Furnaces." A. W. Childs presented the paper of W. M. McKnight entitled, "A Stassano Furnace Installation at Redondo, Cal." F. T. Snyder presented his paper entitled, "Electric Furnace Power Loads." All these were discussed at one time. J. E. Kearns opened the discussion by pointing out the value of industrial electric heating business and the possibilities of electric furnaces. He thought the electrical industry should advocate electric furnaces in preference to other types rather than boost any one type of electric furnace.

H. O. Loebel, New York, discussed some features of electric resistance furnaces described in Mr. Bartlett's paper and urged that very close study be given electric furnace applications. The business can be vitally hurt by an improper selection of equipment.

M. O. Dellplain, Syracuse, N. Y., thought there was a big field for steel casting of proper quality; the electric furnace makes such products possible. It will probably be necessary to make trial installations to demonstrate the merits of electric furnace. He believed it the duty of the central station to interest new manufacturers in electric furnace production. The Syracuse company has just closed a contract for an 800-kilowatt single-phase furnace to operate 22 hours a day, the rate being 0.75 cent per kilowatt-hour at 11,000 volts measured on the primary.

Fourth Technical Session.

The fourth technical session was held on Thursday morning with Robert S. Orr, of Pittsburgh, in the chair. The report of the Committee on Terminology was first presented and this was followed by the report of the Committee on Street Lighting, which was read, in the absence of Chairman J. W. Lieb, by Preston S. Millar.

The report of the Committee on Underground Construction was then presented by Philip Torchio. There was no discussion of the above reports.

The report of the Committee on Accident Prevention was the next thing on the program, and this was followed by a paper by C. D. Scott, entitled "Opportunities of the Public Service Companies in General Accident Prevention."

In discussing this paper, M. C. Turpin, of Pittsburgh, called attention to the co-operation of large industrial manufacturers and the public-utility companies in the Pittsburgh district, so that the work of devising new safety rules and apparatus might not be duplicated. When any new device is brought out, blue prints and methods of construction and application are available to all parties interested. The federal Department of Labor has also co-operated with the Pittsburgh interests by sending speakers, equipped with motion-picture films and lantern slides, to lecture in the various districts.

J. A. Lighthipe, of Los Angeles, said that 60 per cent of the accidents were due to carelessness. The Southern California Edison Company holds district meetings under the direction of a safety committee, and one of the most important matters is the continual education of employees and public regarding danger of dangling wires. Also, workmen must be disciplined, as, particularly in line construction work, these men are usually brave and reckless and will risk their lives a dozen times where they would not risk their jobs. These men must be watched, and if they cannot be cured of reckless habits, they must be weeded out. Another thing to be guarded against is that if a man is depressed or worried because of financial or family difficulties, he must not be sent out on dangerous work. Furthermore, every man must be to some extent his brother's keeper and as far as possible men are worked in crews and instructed to be on the alert, not only to save themselves from accident, but to watch out for the man working alongside.

G. A. Gilkerson pointed out the importance of a company getting a good start for its educational work. When a company demonstrates its willingness to spend thousands of dollars to make conditions electrically and mechanically safe, the workmen and public generally will be more disposed to do their part.

E. R. Northmore said that with the Los Angeles Gas and Electric Corporation, complete control is exercised over the use of workmen's tools. Each man is furnished with a complete set of new tools free of charge. Men take exceptionally good care of tools and in two years there has not been an accident traceable to the use of defective equipment.

Accounting Sessions.

The first accounting session was held on Tuesday afternoon with E. W. Lloyd as chairman, and H. M. Edwards as vice-chairman. Mr. Edwards, as chairman of the Accounting Committee, stated that it was the hope that the Accounting Section would take its place as one of the definite divisions of activity of the Association under officials of its own choosing and with the entire body of the Section membership available for committee work. There was a recently aroused interest in accounting matters co-incident with the advent of governmental activity in the regulation of the industry. The accounts, which epitomize the history of an enterprise, must conform to prescribed rules and uniformity in account keeping must prevail if comparisons are to be of value.

The report of the Library Committee was then presented by Frederick Schmitt.

The report of the sub-committee on a Uniform System of Accounts was presented by J. L. Bailey, chairman. A long discussion ensued, particularly with reference to the disposition of sinking-funds account.

L. R. Reynolds then presented a paper on "Some Opportunities of Public-Utility Accountants."

The second accounting session was held on Wednesday morning, with Vice-President L. D. Gibbs in the chair. The first paper to be presented was one by W. G. Cowles entitled "Workmen's Compensation Insurance." This paper was read by Mr. Schmitt.

A written discussion which was contributed by Albert W. Whitney, general manager of the Casualty Insurance Company, was then presented.

E. F. Peck, of Schenectady, N. Y.,

contributed a discussion embracing recommendations which had been prepared by the Empire State Gas and Electric Association.

A paper by W. P. Kennedy entitled "Electric-Vehicle Cost Accounting," was then presented, in the absence of the author, by A. Jackson Marshall.

In discussing this paper Day Baker, Boston, Mass., described the highly efficient use of electric trucks by industrial and public service corporations, notably the New York, New Haven & Hartford Railroad Company, which, with two five-ton trucks, covering only 16 miles per day, saved the railroad corporation something like $42 per day over and above the cost of doing the same work by what is known as the shifter process. Complaints on lost freight and delayed freight have been reduced seven per cent.

The session closed with the presentation of a paper by P. R. Ferguson entitled "Record of Property or Construction Expenditures." The author said that it is important that records be made and maintained of all property acquired or constructed. If such a record were always available there would probably be less demand for inventories. An attempt is made in this paper to outline a complete system for construction expenditures. Many blank forms are shown that cannot fail to be helpful in classifying what in the nature of things must be a more or less shifting body of details. A routine is outlined for requisitions, authorities, purchase and work orders. Executive and construction departments should be able to get at the cost of the property, not only as a whole, but by geographical areas.

The third accounting session was held on Thursday morning, with President Holton H. Scott in the chair, and H. M. Edwards acting as vice-chairman. After calling the meeting to order, President Scott turned the chair over to Mr. Edwards. The report of the Committee on Cost Accounting was read by J. H. Gulick, of Chicago.

This was followed by a paper entitled "Analytical Accounting for Central-Station Purposes," by O. B. Coldwell, of the Portland Railway and Light Company.

W. W. Freeman was the author of the next paper, entitled "Statistical Machines," which was read by Mr. Schmitt.

The meeting then proceeded to organize the Accounting Section by adopting a constitution and by-laws, which had been prepared by a committee. Officers were then elected as follows:

Chairman, H. M. Edwards, of the New York Edison Company.

Vice-Chairman, J. L. Bailey, Baltimore, Md.

Secretary, E. J. Allegaert, of the Public Service Electric Company, Newark, N. J.

Treasurer, C. E. Calder, of the Texas Power and Light Company, Dallas, Tex.

Executive Committee: R. H. Ballard, of Los Angeles, Cal.; J. L. Gould, of Smith Falls, Ont.; J. H. Gulick, of Chicago, Ill.; R. W. Symes, of Detroit, Mich.; L. M. Wallace, of Boston, Mass.; Paul R. Jones, of New York City, and B. H. Dexter, of Seattle, Wash.

Public Policy Session.

The public policy meeting, which was held on Thursday evening, was a very impressive one. President Holton H. Scott occupied the chair, and the report of the Public Policy Committee was presented by W. W. Freeman, of Cincinnati, chairman of the Committee.

Max Thelen, president of the Railroad Commission of California, then made an address on the subject "Public Utility Regulation in California." Mr. Thelen reviewed the development of hydroelectric plants in California. The first of these was installed in 1891. Today there are 25 companies, which generate hydroelectric energy in 79 separate plants. This energy is distributed to 1,500 miles of transmission line, and 18,000 miles of distribution line. The total capacity of these hydroelectric plants is 436,000 kilowatts, and the energy generated in the year 1914 amounted to over two billion kilowatt-hours.

Mr. Thelen paid a high tribute to the men who have made this wonderful development possible. He called attention to the complex problems of regulation which such development has created, and of the difficulties encountered by the California Railroad Commission on account of a law which until recently permitted municipalities to regulate rates within their own borders. This segregation of control has hampered the commission in attaining uniformity, especially with respect to line-extension policies. The effect of regulation on the ability of the utilities to raise capital was discussed at some length, and Mr. Thelen expressed the opinion that where protection is afforded there should be less difficulty in disposing of securities. Without regulation unscrupulous companies would be permitted to sell watered stock, and thus destroy the confidence of the public in the securities of public utility corporations. He cited a case of a sale of stock at a cost to the company of only 85 cents per share. This, he thought, indicated the confidence of the public in the security issue in question. This confidence is due to a supervision of the issue of securities by the Railroad Commission.

In concluding his talk, Mr. Thelen stated that it is no longer a question between commission regulation and no regulation at all, but between government regulation and municipal ownership.

The last paper of the evening was by John H. Roemer, of Chicago, formerly a member of the Railroad Commission of Wisconsin. This paper was entitled "Municipal Regulation of Public Utilities;" an abstract of the paper is given on page 1107.

An excellent musical program was rendered during the evening by the Glee Club of the Pacific Gas and Electric Company. Motion pictures were shown on the screen illustrating National Electric Light Association Day at the Panama-Pacific International Exposition.

Fifth Commercial Session.

T. I. Jones, Brooklyn, N. Y., presided at the fifth commercial session on Friday morning. The paper entitled "Demonstration of a Power Sale," was presented by C. H. Stevens, Brooklyn, N. Y. R. B. Mateer, Riverside, Cal., opened the discussion by criticising the establishment of a power department of such proportions as outlined in the paper, believing that individuality of transaction is eliminated by transacting business through so many channels.

M. O. Dellplain, Syracuse, N. Y., thought it inadvisable to make distinction between power salesmen and power engineers. He urged that emphasis be laid on the fact that a customer could make a trial central-station installation for a period of a year and at the end of this trial would be in exactly the same position with regard to his ability to install an isolated plant as before. Any additional expense if a change was desired at the end of the year would be negligible.

M. C. Osborn, Spokane, Wash., commented on the power situation in his district. The total power load aggregates 12,000 horsepower, considerable of which is in mining districts. The mine business has averaged a load-factor of 60 per cent and has become so standardized that it is easily obtained.

J. G. Learned, Chicago, felt that too much emphasis is placed by central-station companies on savings which purchase of power will effect. This attitude places the company on the defensive. Greater stress should be laid

on service, cleanliness, and so forth.

R. L. Lloyd, Philadelphia, Pa., thought that particular emphasis should be placed on depreciation of isolated plants. Manufacturers usually operate on borrowed money, on which they pay about five per cent interest. If the money invested in the isolated plant were used in the manufacturing business a net earning of 15 per cent could be obtained on this amount.

C. N. Stannard, Denver, Colo., spoke of the personnel of the sales department and favored employment of technically trained power salesmen.

R. H. Knowlton, Philadelphia, Pa., stated that in many instances it is not desirable to leave a proposition covering details of central-station service with the manufacturer, as this is usually turned over to a consulting engineer. It is better practice to return with a proposition to discuss with the manufacturer and consulting engineer, if desired.

S. V. Walton, San Francisco, Cal., commented on various phases of power business on the Pacific Coast, which is considerably different than in the East. Some of the industries, such as gold dredging, would be impossible without central-station service. Electricity has been developed to such an extent in the West that prospective power users invariably look first to the central station for power supply. Lately some competition is being felt from Diesel oil engines.

C. A. Littlefield, New York, spoke briefly regarding the power conditions in the Borough of Manhattan. There is a large volume of small power business which it is comparatively easy to secure.

S. M. Kennedy, Los Angeles, Cal., stated that selling ability should be the most important qualification of power engineers as power salesmen. He contended that the saving to the prospective customer is the most important item in securing power business, and in figuring this saving such advantages as continuity of service, elimination of power troubles, increased production, cleanliness and other intangible items should be given proper consideration.

M. C. Osborn, Spokane, Wash., brought out the point that the cost of power usually averages less than two per cent of the total unit cost of manufacturing. In soliciting power business, an analysis should be made on this basis, as very few manufacturers realize this point.

H. P. Pitts, of San Francisco, Cal., stated that his experience has been that very few manufacturers operating isolated plants know their own power costs. He thought it extremely necessary that power salesmen should familiarize themselves with the manufacturing processes of any industry which they are trying to secure as a central-station customer. He cited the example of a large steel-mill contract which had been secured because the power salesman was able to gain the confidence of the manufacturer by suggesting a number of time-saving and money-saving operations.

A similar idea was expressed by a representative of the San Diego Consolidated Gas and Electric Company, who pointed out how an irrigation business aggregating several thousand horsepower was secured by having a power salesman visit irrigating districts in other localities so as to become entirely familiar with the operations of this business. Considerable success resulted also from taking prospective users of central-station power to visit successful installations which had been made in other territory.

Edward William Lloyd,
President-elect of the National Electric Light Association.

J. G. Learned, of the Public Service Company of Northern Illinois, then presented the report of the Committee on the Chairman's Address. Mr. Learned also presented the report of the Nominating Committee, which was accepted, and the following officers were elected:

Chairman, J. F. Becker, United Electric Light & Power Company, New York City.

Vice-chairman, E. A. Edkins, Commonwealth Edison Company, Chicago, Ill.

Second vice-chairman, C. J. Russell, Philadelphia Electric Company, Philadelphia, Pa.

Secretary, C. A. Littlefield, New York Edison Company, New York City.

New members of the Executive Committee were elected as follows: N. H. Boynton, Cleveland; William R. Collier, Atlanta, Ga.; J. C. McQuiston, East Pittsburgh, Pa.; E. W. Rockafellow, New York City; and R. R. Young, Newark, N. J.

Final General and Executive Session.

On Friday morning was held the second general session, followed by an executive session. President Holton H. Scott presided. George B. Foster, Chicago, Ill., presented the report of the Committee on Company Sections. A paper on "Company Section Work," prepared by D. C. Bruce, Baltimore, Md., was read by title and accepted for publication in the proceedings.

A paper entitled "The Electric Vehicle and the Central Station," prepared jointly by J. F. Gilchrist, Chicago, Ill., and A. J. Marshall, New York, N. Y., was read by the latter.

J. M. Wakeman, New York, general manager of the Society for Electrical Development, Incorporated, presented an interesting review of the work of the society and spoke of the extensive plans which have been formulated for an Electrical Prosperity Week. He announced that the Panama-Pacific International Exposition would celebrate the Prosperity Week with special spectacular effects.

The report of the Committee on Doherty and Billings Prizes for Company Section Papers was then presented. The Doherty Gold Medal was awarded to W. D. Katzenberger, of Brooklyn, N. Y., for a paper entitled "Securing of Big Power Business." The Harriett Billings Medal was awarded to A. G. Paulsen, of Brooklyn, N. Y., for a paper entitled "Conditions for Securing Continuity of Central-Station Service."

The matter of revision of the Association's constitution and by-laws was brought up, and an amendment was adopted providing for the establishment of a Manufacturers' Section composed of Class D and Class E members; the Executive Committee of the National

Association is to include the chairman and two members of the Manufacturers' Section.

The report of the Nominating Committee was then presented. The following list of nominees for officers of the National Electric Light Association for the ensuing year was submitted and in the election following they were unanimously elected:

President, E. W. Lloyd, contract agent, Commonwealth Edison Company, Chicago, Ill.

First vice-president, H. A. Wagner, vice-president, Consolidated Gas, Electric Light and Power Company of Baltimore, Baltimore, Md.

Second vice-president, W. F. Wells, second vice-president and general manager, Edison Electric Illuminating Company of Brooklyn, Brooklyn, N. Y.

Third vice-president, R. H. Ballard, secretary and assistant general manager, Southern California Edison Company, Los Angeles, Cal.

Fourth vice-president, R. S. Orr, general manager, Duquesne Light Company, Pittsburgh, Pa.

Secretary, T. Commerford Martin, New York City.

Treasurer, W. H. Atkins, general superintendent, Edison Electric Illuminating Company of Boston, Boston, Mass.

Assistant secretary and treasurer, Miss Harriett Billings, New York City.

Insurance expert, W. H. Blood, Jr., Boston, Mass.

New members of the Executive Committee to serve three years: J. E. Davidson, Portland, Ore.; H. C. Bradley, Boston, Mass.; H. C. Abell, Brooklyn, N. Y.; R. F. Pack, Minneapolis, Minn.

Resolutions were unanimously adopted expressing the thanks of the Association to all who had contributed to the marked success of the convention and to the comfort and entertainment of the members and guests.

The convention then adjourned.

Electrical Exhibits at Panama-Pacific International Exposition.

While the number of exhibits of a strictly electrical nature at the Panama-Pacific International Exposition may be considered somewhat disappointing by those interested in electrical affairs, the entire Exposition is really a practical demonstration of the unlimited uses of electricity on a scale of huge magnitude.

Aside from the illumination, which is marvelously spectacular and new, yet practical in every sense, electricity is everywhere apparent on the grounds and in the buildings. In fact, many of the exhibits are possible only through the use of electricity for power, light or heat.

A significant feature of the exhibits, particularly in the Palace of Machinery and the Palace of Manufactures, is the fact that they are shown in operation wherever this is possible, electric motors being employed.

A majority of the electrical exhibits are grouped in the Palace of Machinery, which is said to be the largest frame building in the world. Within its eight-acre area are housed the most comprehensive displays of machinery and mechanical and electrical equipment ever exhibited. The most noticeable feature in the building is the large number of operating exhibits. Several engine and generator manufacturers are supplying electrical service for portions of the building and for individual displays.

The following is a brief description of the electrical exhibits:

Baruch Electric Controller Corporation, San Francisco, Cal. This exhibit comprises practical demonstrations of thermo relays and circuit-breakers for alternating and direct-current apparatus. Motors are equipped with overloading devices so that the operation of the relays and breakers under operating conditions can be shown. The principle of the thermo relay is that it controls electric circuits by means of the heating effect of the current. The exhibit is in charge of E. R. Jackson, sales engineer.

The Bristol Company, Waterbury, Conn., occupies a space in the center of the Palace of Machinery. This exhibit is described on page 1131. The exhibit is in charge of B. J. Klein and F. Van Black.

Busch-Sulzer Brothers Diesel Engine Company, St. Louis, Mo., is operating a 500-horsepower Diesel engine direct-connected with a Westinghouse 335-kilowatt, 220-volt direct-current generator, supplying energy for various uses throughout the building. The engine is of the four-cylinder single-acting vertical type. This exhibit was the first to be installed, and was set in motion on Opening Day by President Wilson. It was described in the issue of January 2.

Century Electric Company, St. Louis, Mo., shows its complete line of single-phase motors, ranging in size from 0.05 horsepower to 30 horsepower. The motor exhibit includes vertical and back-geared motors and special designs for various applications, such as for linotype machines, type-setting machines, air compressors, ice-cream freezers, etc. Several of the motors are dis-assembled, showing the construction. The fan exhibit of this company includes its complete line of bracket, desk and ceiling fans; also ventilating fans and blowers. The Century fan motors are generally known as the split-phase induction type of single-phase motor; no moving wire is used in their construction. The Century Company is also showing a new alternating-current motor of one-sixth horsepower which will develop a high starting torque with low starting current. It is claimed that this motor starts under full load on a three-ampere fuse. The exhibit is in charge of R. J. Davis.

The General Electric Company, Schenectady, N. Y. This company has one of the most attractive exhibits at the Exposition in the Palace of Manufactures, known as the "Home Electrical," described last week. Its industrial exhibit is in the Palace of Transportation and includes a complete line of industrial and railway equipment, electric locomotives, transformers, station and line equipment, etc. This was described in the issue of January 16.

G. M. Gest, New York, N. Y., is maintaining a very interesting exhibit designed to show the construction of underground conduit systems. In one section of the exhibit space are shown the various methods of installing underground conduit for a drawn-in system, including creosoted-wood duct, fiber conduit, iron pipe, clay conduit, single round bore, square bore, and clay multiple duct; also methods employed in Europe known as the cast-iron trough, asphalt trough and tile trough. Of the solid systems are shown armored cable laid directly in the ground, armored cables in conduit and also the Edison tube system of distribution. Another section of the exhibit is constructed to represent three standard manholes; one for telephone service, one for electric light and power and one transformer vault. Each manhole is equipped with the various forms of apparatus for the proper distribution of electrical energy such as transformers, junction boxes, fuse boxes, cable terminals, etc. The installations are made in accordance with the latest practice and illustrate the ideal conditions that can be obtained by the application of proper engineering skill. Above the manholes is shown a model street provided with ornamental lighting poles and a street pillar box, such as are used in Europe. In addition to the practical installation of underground work drawings are shown of the plans for complete underground systems; also a collection of transparencies showing special features of underground conduit construction and lighting systems in various parts of this country and Europe. F. R. Lewis is in charge of this exhibit.

Hughes Electric Heating Company, Chicago, Ill., has a very interesting working display of electric ranges and ovens in the booths of the Sperry Flour Mill Company, a complete description of which appeared in our issue of March 27.

The Industrial Instrument Company, Foxboro, Mass., is showing a very complete line of indicating and recording instruments for measuring temperature, pressure, speed and time; also automatic temperature controllers. Many of these are connected to operating machinery throughout the building, so as to record actual conditions. The exhibit is in charge of A. F. Mundy.

The Hoover Suction Sweeper Company, New Berlin, O., is showing four sizes of its portable electric vacuum cleaning machines. Demonstrations are made showing the efficiency of these cleaners.

The Mohrlite Company, San Francisco, Cal., is showing 24 types of fixtures for indirect and semi-indirect lighting, which are also illustrated in many installations throughout the grounds.

The Majestic Electric Development Company, San Francisco, Cal., is showing its line of portable and stationary electric heaters and radiators. These are made in seven styles and sizes, each

using the same type of heating element. It is claimed that each unit attains a temperature of 2,000 degrees Fahrenheit.

The Otis Elevator Company, New York, N. Y., has reproduced a very attractive miniature roof garden on an elevated structure reached by four elevators, each of a different type.

W. J. Marland, Oakland, Cal., is maintaining a very interesting collective exhibit, where practical operating demonstrations are given of the uses and advantages of the appliances shown. The products displayed cover material and devices of interest to the engineer, the layman and to the ladies, as well as the men. The companies represented by Mr. Marland are as follows:

Aladdin Lamp Corporation, New York, N. Y.
Central Telephone & Electric Company, St. Louis, Mo.
Economy Fuse & Manufacturing Company, Chicago, Ill.
Edison Storage Battery Company Orange, N. J.
Gould Car Heating & Lighting Company, New York, N. Y.
Hanovia Chemical Company, Newark, N. J.
Home Washing Machine Company, Incorporated, Brooklyn, N. Y.
Innovation Electric Company, New York, N. Y.
Koerting & Mathieson, New York, N. Y.
Nicholas Power Company, New York, N. Y.
Lewis M. Pignolet, New York, N. Y.
Safety Car Heating & Lighting Company, New York, N. Y.
Shelton Electric Company, New York, N. Y.
W. E. Slaughter Company, Incorporated, Chicago, Ill.
Standard Electric Incubator Company, New York, N. Y.
United States Light & Heating Company, Niagara Falls, N. Y.
Williams Medical Battery Company, New York, N. Y.

These exhibits are all in charge of W. J. Marland, assisted by a corps of demonstrators. These exhibits were described in our issue of April 3, 1915.

Pacific Electric Manufacturing Company, San Francisco, Cal., has installed a representative outdoor substation in the form of a steel tower equipped with banks of high and low-tension transformers, air-break main-line and lateral switches, oil circuit-breakers and grounding switches. The transformers were furnished by the Moloney Electric Company, of St. Louis, Mo. The transformers are served with electricity from the Exposition mains, and the voltage is raised from 33,000 for demonstration purposes. A standard Baum switch with electric remote control is displayed in such manner that all details of construction can be observed. There is also shown a new type of sectional switch, which is being used extensively by western power companies. The feature of the exhibit is a new switch, combining the functions of both the oil and air-break types, its fundamental principle being that the installation of the oil-switch portion is not under electrical stress, except when the switch is being opened or closed. This switch is designed for any voltage, from 30 to 100,000, and up to 50 amperes. It is designed primarily to protect lateral lines and for substations and large banks of transformers. This exhibit, which also includes miscellaneous switchgear and high-tension apparatus, is in charge of T. E. Collins, sales manager.

Pacific Telephone & Telegraph Company, San Francisco, Cal., has an auditorium, the Palace of Liberal Arts, where daily lectures are given relative to transcontinental telephone service between New York and San Francisco and Los Angeles. There is a map in this auditorium showing the transcontinental telephone line dotted with miniature incandescent lamps.

Sangamo Electric Company, Springfield, Ill., has a very interesting and instructive exhibit, showing the various types of its instruments and their applications. From the center arch of this exhibit is hanging a large glass dial, which is electrically operated from a meter located on the east wall of the building, and records the entire alternating-current load of the Palace of Machinery. In other sections of the exhibit there are on display a number of smaller dials of this type, such as are used on electric vehicles, and in other places where it is desirable to duplicate the reading of a meter at any distance from the meter. In another section of the exhibit is shown the application of the Sangamo ampere-hour meter in connection with the automobile storage battery. A small isolated plant is shown in operation, which supplies part of the current that is used in the booth. An ampere-hour meter is used on the switchboard to show the exact amount of charge in the batteries at any time. In the rear of the booth is located a complete axle generator equipment, also equipped with ampere-hour meter. Adjacent to this is shown the vestibule of a street car with street railway ampere-hour meter installed. There are also various switchboard panels displayed, equipped with standard meters and instruments manufactured by this company. In several places in the booth are located showcases containing groups of transformers, shunts, and portable testing meters. There are also showcases showing the parts of typical meters and their method of assembly and the processes of manufacture of the parts. The exhibit is in charge of A. J. Anderson and G. M. Torzillo.

Standard Underground Cable Company, Pittsburgh, Pa., has a complete exhibit of its products, showing in detail the evolution from the copper bar to the finished forms, and types of bare and insulated copper wires and cables for all electrical purposes. The booth is inclosed by a unique fence made of two-million-circular-mil cable and copper bars, such as received from the mills as fence posts. New and novel types of cables, junction boxes, open-air and station terminals are displayed. In the showcases and on racks and tables are found representative samples of bare and insulated wire and cable, braided, lead-covered and armored. There are also showcases in which are shown samples of wire and cable manufactured 25 years ago. There are also in this exhibit two standard poles representing the changing of underground to aerial line construction through Davis open-air terminals. An interesting feature of the exhibit is the demonstration of braiding wire, two machines being installed for this purpose.

The Robbins & Myers Company, Springfield, O., is maintaining a very attractive exhibit in the Palace of Machinery in charge of C. R. Hunt. This was described in the issue of March 6.

The Temco Electric Motor Company, Leipsic, O., is showing a complete line of electric buffers, grinders, portable drills, small motors and parts.

R. Thomas & Sons Company, East Liverpool, O., is showing a complete line of high and low-tension insulators, cross-arms, porcelain and metal pins, clamps, bushings, railway material and standard wiring material, such as knobs, cleats, tubes and bushings. The exhibit is in charge of G. R. Thomas.

Star Electric Company, Newark, N. J., is operating the central police and fire alarm station for the Exposition, all of the material and equipment being of its own manufacture.

Thordarson Electric Manufacturing Company, Chicago, Ill., is showing a complete line of toy transformers, bell-ringing transformers, wireless transformers and equipment, and other high-tension and experimental apparatus. A. S. Lindstrom is in charge of the exhibit.

Western Electric Company, Chicago, Ill., is exhibiting a complete line of telephone equipment, which was described in the issue of April 24. The exhibit is in charge of M. S. Orrick.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has 10,000 square feet of floor space in Palace of Machinery devoted to the display of household devices used in the home, on the farm, and in various professions and lines of manufacture. In addition to this space the company is maintaining an extensive exhibit of railway equipment in the Palace of Transportation, which was described in the issue of February 13. The Westinghouse exhibit in the Palace of Machinery comprises some 25 electric motors of various types adapted to general power purposes. These motors are demonstrated under operating conditions. There are also tables of Westinghouse electric cooking and heating appliances for domestic and commercial use. The exhibit also includes a complete line of fans, arc lamps, incandescent lamps, transformers, etc. A 500-kilowatt steam-turbine unit, with condenser, generator and exciter is also shown. A working model of the Westinghouse-Parsons marine steam turbines installed in the collier *Neptune* is a feature of the exhibit.

Chicago Electric Club.

At the meeting of the Electric Club-Jovian League of Chicago on June 2 an address was made by Cy De Vry, superintendent of the Lincoln Park Zoological Garden. Mr. De Vry exhibited a large number of lantern slides, showing his pets, and also a number of motion pictures.

Trade-Extension Trip.

The James Clark, Jr., Electric Company was represented on the trade-extension trip which was conducted into the eastern parts of Kentucky and Tennessee, and western Virginia by a delegation of 100 or more Louisville business men. The special train carrying the party left Louisville on June 7 and was gone four days.

Hearing of Federal Trade Commission.

The first public hearing to be held by the new Federal Trade Commission since its organization occurred at the Chamber of Commerce, Boston, June 1 and 2. The subject of the inquiry concerned trade conditions in and with foreign countries, and a number of prominent industrial and financial leaders of New England were called. Chairman Joseph E. Davies presided.

At the session on the morning of June 1, Everett C. Morss, president of the Simplex Wire & Cable Company, Cambridge, Mass., spoke before the board. He said the business of his company with foreign lands is only incidental. Inquiries from Europe and South America have led him to take a half-page in a leading English electrical publication, which, he thought, might result in some business. The European war conditions are the immediate cause of the unusual attention being directed toward the South American field, but in order to make the conquest of foreign markets effective a systematic campaign, covering a term of years, is necessary. For many manufacturing companies the only practicable method would be to combine with manufacturers of allied products, but of varying specialties.

If manufacturers were to undertake a selling plan in alliance with competitors, would it run counter to the anti-trust laws? The uncertainty as to what is lawful and what illegal is a serious deterrent to the development of foreign business, said Mr. Morss. Interpretations of the anti-trust laws are liable to vary with the changing membership of regulating boards, and with changing public sentiment.

The speaker pointed out that ordinarily a business man is justified in taking risks for immediate profit, but in entering the foreign field the long time required for preparing the ground before results are obtained calls for surety that a project will not have to be abandoned after three or four years. Under other conditions, an adverse ruling on the part of the Government might mean a loss of a considerable amount of outlay by the enterprising manufacturers. If manufacturers of certain lines of goods were to make a drive for export trade it might be necessary to combine with a number of competitors on the matter of specifications. Foreign ideas as to electrical merchandise differ from American; it is almost impossible to manufacture some lines of goods in the United States on specifications established by the English, Germans or French because different machinery is required. The Simplex company's business, Mr. Morss said, developed along American ideas. It is producing goods by processes thought impossible in England at the time of their adoption here.

Foreign prejudice respecting electrical goods is on questions of design, not of quality.

Mr. Morss pointed out that to establish a foreign trade it might pay manufacturers to produce to full capacity, sell 85 per cent in this country and the balance abroad at a reduced price, in order to get the full advantage of overhead costs, assuming the full 100 per cent of product could not be marketed at home.

The chairman pointed out that the country is committed to the Sherman Act and it is probable Congress would uphold the principle as far as applied to domestic trade. If co-operative movements were underaken for foreign trade, he asked how the benefits could be made to accrue to all the manufacturers of this country.

Mr. Morss replied that the promoters of the undertaking would naturally expect to reap the direct rewards of their daring and energy, but that any systematic campaign undertaken by the trade as a whole would result in benefit and profit to the trade as a whole. Even the manufacturers who held aloof would benefit indirectly, in that the ground would be prepared for their salesmen by the education of the foreign peoples in the use of American-made goods.

There are 35 or 40 manufacturers of wire and cable in the United States. Mr. Morss said he would be glad to see all these competing concerns join in a campaign for foreign trade on the basis of proportionate shares in the expense and profits.

Ex-Mayor Fitzgerald; Edward A. Filene, merchant and philanthropist; Louis K. Liggett, president of the United Drug Company; Frederick P. Fish, ex-president of the American Telephone & Telegraph Company; Howard Coonley, of the Walworth Manufacturing Company; Charles H. Jones, shoe manufacturer; Henry Howard, president of the Merrimack Chemical Company; F. A. Goodhue, vice-president of the First National Bank; and others related their experiences in connection with foreign export trade in manufactures, and in banking relations with South American countries. It was the consensus of opinion that branch banks should be established by American banks of large capital; that the Sherman Act should be modified so as to leave no doubt as to the legality of co-operative selling policies by American manufacturers, and that transportation facilities should be improved so as to put us on a par with Europe.

The necessity of a careful study of Latin-American conditions by the best men available, and of the willingness to conform to local prejudices and traditions in methods of business and length of credits, were pointed out by a number of speakers.

Frederick P. Fish said trade with South America will not succeed until a co-operative plan is worked out. America's very virtues of intelligence and self-reliance stand in the way of getting foreign business. He deplored attempts on the part of salesmen to reform South American methods.

Cut-throat competition, and "dumping" of surplus goods, do not make for a healthy growth of trade. These can be eliminated by organization and the selection of the most competent agents obtainable, said Mr. Fish.

Representatives of the chemical trade said that most American manufacturers of those products are not in a position to send out their individual foreign salesmen; a plan of co-operative selling must be devised.

Former Mayor Fitzgerald, who is chairman of the Foreign Trade Committee of the Boston Chamber of Commerce, said that the United States Government should give its active assistance to foreign trade, as does the German Government. He held that New England's future markets lie to the east, where a population of 1,500 millions await its products.

Walter C. Fish, manager of the Lynn Works of the General Electric Company, mentioned the handicap this country is under in the foreign markets, due to much higher wages and lower efficiency than Europe. He deplored Congressional interference in securing efficient factory production, by its action which forbids time studies in arsenals. This is one instance of the hindrance to intelligent work, that is imposed by legislation. He believed in most of the health and labor laws; they promote efficiency; but there are also certain impediments to the largest production.

Mr. Fish pointed out the need of retaining foreign trade once it is secured. Constant education, by trade schools and in other ways, is needed in order to keep abreast of the times. The future of business, both domestic and foreign, lies with the young men of today.

Outing of Tennessee Company.

About 500 officials and employees of the Tennessee Light & Power Company turned out last Saturday for the annual field day of the company. Delegations from Nashville, Chattanooga, Cleveland, Caney Creek and Parksville were present at the outing which was held at Parksville.

Building permits issued in 67 American cities during the four months ended April 30, 1915, totaled $191,056,490, or only six per cent less than in the corresponding period last year.

Abstracts of Papers and Reports Presented at Convention of National Electric Light Association.

General and Public Policy Sessions.

Report of Insurance Expert.

BY W. H. BLOOD, JR.

The insurance expert has given special attention during the past few years to suits brought against member companies at the instigation of fire insurance companies. The insurance interests have specialized in these suits, while the attorneys of the electric lighting companies are at a disadvantage because they are unfamiliar with precedents and not ordinarily well posted on electrical matters.

The insurance expert has found it wise to give the attorneys of the local lighting companies suggestions as to the kind of evidence necessary, to submit references to court decisions, to do a general educational work along electrical lines, to assist as a general adviser, and also as an expert witness. As a result of this procedure no new precedents have recently been established.

In the suit of the Milton Weaving Company, brought against a member company for about $80,000, the defendant came out victorious. The facts brought out in this suit showed that it is highly desirable for electric lighting companies to refrain from doing any kind of wiring in or on the premises of their customers. Attention is called to a ruling of the New York Public Service Commission in which a lighting company was ordered to renew its wire connection to a customer, although the company had the statement from the Underwriters' inspector that the inside wiring was in bad condition.

The National Electrical Code was revised this year, full details of which have previously been published.

Attention is called to the general tendency of grounding of distributing circuits and of running the ground line as a solid wire.

Other details of the insurance expert's activities are outlined and correspondence and co-operation with his office are solicited.

Report of Committee on Progress.

BY T. C. MARTIN.

The report deals with the general conditions of the industry, calling particular attention to its steady advance and to its remarkable recuperation from the conditions resulting in the fall of 1914 from the great European war. Attention is also directed to some of the conditions abroad in the central-station field, with special notice of the differences in American and European wiring conditions. A section of the report is devoted to municipal ownership showing that in spite of considerable agitation, private ownership in the central-station field has relatively gained enormously during the last five years in the United States.

The subject of central-station engineering work is then taken up, and several instances of development are cited, particularly in regard to details, as there have recently been no additions to the number of large typical stations. The various departments are then taken up in succession, such as lamps and lighting, miscellaneous motor work, electricity in rural districts, the electric vehicle, electric heating and cooking, interior wiring, and miscellaneous points in connection with central-station management, employees and office buildings.

Part II of the general report on progress is devoted to hydroelectric and power-transmission development. The first part of this section deals at considerable length with the highly important proposed national legislation on conservation, and summarizes a great deal of valuable evidence with regard to the injurious effect of various proposed limitations and restrictions from which the public suffers more than those who would otherwise devote their energies and capital to the utilization of our water-power resources. In the technical part of the report considerable space is devoted to the rules of the California Railroad Commission in regard to circuits affecting or affected by inductive interference. Note is also made of a few power-transmission plants and more particularly of auxiliary steam substations intended to maintain continuity of service even through the utmost conditions of minimum flow. Various features of transmission work are also brought to notice in regard to hydroelectric development and utilization in different parts of the country. A final section is devoted to a few foreign plants and foreign conditions.

Revivals.

BY PAUL LUPKE.

The paper points out the desirability of periodical revivals to keep matters from running in a rut. It cites particular instances in support of this contention. It further shows that a revival is necessary to correct the public's corporation conscience, and lays stress upon the necessity of active assistance from every one connected with the industry to remove prejudice against utility corporations.

Report of the Public Policy Committee.

BY W. W. FREEMAN, CHAIRMAN.

The committee has carried on routine work during the past year as usual. The report gives a condensed review of some of the events of the year. Financial affairs have given considerable anxiety, but although the operating revenue of the steam railroads of the country declined $78,116,000 from the preceding year, and net revenues $47,771,000, the gross earnings of 275 large public utility companies increased $41,438,000 and the net earnings increased $10,454,000. Member companies are advised to broaden the market for securities by keeping local investors informed of their merits, and by a policy of frank publicity as to earnings and financial condition. Regulation by public commissions is endorsed. Three additional states have adopted such regulation, making 32 in all, besides the District of Columbia. There are still 16 states without such regulation. A map accompanies the report, showing the distribution of these states, which are mainly in the South. In specific cases commissions have allowed rates of return of from 7 to 10 per cent, 8 per cent being the figure generally adopted. In some states appraisals are required by law before fixing rates, but it is pointed out that this involves a great expense and is by no means necessary in all cases. It is anticipated that less importance will be attached to elaborate appraisals in the future. Seventeen states now provide that competing companies must obtain certificates of necessity from the state commission, and in eight states the provision applies to municipal plants. Protection from competition is advocated in the interest of the public as well as the utility companies, and authorities are cited to support this statement. It is pointed out that there has as yet been no court decision in any electric rate case, but such a case is now pending in the case of the Springfield (Mo.) Gas and Electric Company. Municipal ownership is discussed and the experience in Cleveland analyzed to show the burden which has been put upon the taxpayers. No federal water-power legislation has yet been enacted. A Supreme Court decision requires that each branch of a utility business shall be self-supporting. First-class service, reasonable rates and liberal treatment of the public are essential to permanent prosperity of any utility company. Emphasis is placed upon these fundamental principles and upon the education of employees. It is pointed out also that the public has obligations to the utility and should properly reward service faithfully and efficiently performed. A strong and efficient public utility is a distinct asset to any community. It is entitled to the good will of the community and the people should exert an effort to promote a sympathetic understanding of the difficulties and problems of the company. Companies should insist upon the recognition of their just claims for public support. An aggressive policy with this object in view will attract attention and win respect.

Municipal Regulation of Public Utilities.

BY JOHN H. ROEMER.

This paper discusses the agitation for what is generally known as "Home Rule," as contrasted with state regulation of utilities by commissions. In the early days of utility industries these were largely local in character. However, the operations of public utilities are becoming so broadened as to be largely of a suburban and interurban character, as well as purely urban. This is particularly true of electric railway systems, telephone lines, and, lately, of electric light and power systems. Even gas is supplied very commonly to more than one town. Mr. Roemer gives statistics to show this tendency as being very marked, particularly in the field of electric lighting and power supply, where the enormous increase in the size

of generating units has made the large electric light and power systems very much more economical than a group of small isolated plants. Instances were cited of several electric power systems in Illinois, one serving 23 communities from a single station, and another serving over 100 communities from eight large central stations. This tendency toward the widening of the scope of utility service should be encouraged, because it makes not only for greater economy in the rendering of the service, but it supplies service of high standards to a great many communities that would be without it. Advocates for municipal home rule of utilities neglect the fact that municipalities seldom possess powers which extend beyond their boundaries, and it is only by special enactment by legislatures that such extra-urban powers are conferred. Since utility service, which includes a number of communities, will doubtless become more and more the practice, it becomes increasingly important to have regulation of this service not by the individual towns served, but by the state at large, so that the regulation will be uniform and consistent in every community. Separate regulation in each town is bound to result in much injustice and involves many difficulties which are eliminated by the uniform practice established by state commissions. Numerous decisions of courts were cited to show that the courts are recognizing the superiority of state regulation as against so-called "home rule." Another advantage of state regulation is that it promotes a more uniform development of all localities. Taking up the subject of municipal ownership, Mr. Roemer showed that where the supply from a municipal plant is necessarily restricted to the city boundaries, the possibility of development on the more economical basis is absent, and where a municipality has served suburban territory it has usually been of such a nature that extensions into the suburban districts have not been made as required. No municipality has been able to manage any business enterprise as successfully and economically as private corporations or individuals. This is largely due to the control of municipal enterprises by political influence. While a member of the Wisconsin Railroad Commission Mr. Roemer noted the very marked defects of operation of municipal plants. Their service was inferior to that of privately owned utilities, their rates were frequently discriminatory, their upkeep was neglected and their accounting was very deficient. Utility regulation is an exceedingly technical problem, and requires the action of a highly trained body with definite responsibilities. Municipal councils seldom possess the requirements. Their attempts at rate regulation, for instance, have been almost invariably arbitrary, and made without proper investigation of the situation. Several instances were cited to show this. Another advantage of state regulation is that it secures uniformity of service standards throughout the state, also a uniform utility policy. The courts have given complete sanction to commission regulation in many cases. Purely local matters should be left to the localities involved, but the general regulation of the utilities is best handled by a state commission.

Report of Committee on Company Sections.

BY F. J. ARNOLD, CHAIRMAN.

The report recites:

The reasons why a committee on company sections was deemed necessary; the results which Class A members think have been achieved by their company sections; some of the successful methods and plans which have been used by local organizations; difficulties which a few sections have had; the committee's idea of the object of the National Electric Light Association as far as Class B members are concerned; the object of a company section; reasons why a man employed in the electrical industry should be a member of the Association; an outline of the campaign for new company sections, and recommendations in respect to the continuance of the work of the committee.

Company-Section Work.

BY D. C. BRUCE.

This paper briefly outlines the methods of handling company section work in the Baltimore Consolidated Section, National Electric Light Association. The entire work of the company section is concisely described in sufficient detail to be used as a guide in the organization of new sections, with the hope also that such portions of the work as are not governed by local conditions may be discussed and standardized practices adopted.

The Electric Vehicle and the Central Station.

BY JOHN F. GILCHRIST AND A. JACKSON MARSHALL.

In preparing this paper, which has been hastily put together, the authors have endeavored to present with some degree of sequence the major phases of electric vehicle development as related to the central station. An effort has been made to incorporate as many working data as possible, without unduly adding to the length and size of the volume, in order that the review may have some future reference value. The authors acknowledge their indebtedness to a number of individuals and committees, whose writings and reports on the subject have been freely used, and in many instances, copied verbatim.

Commercial Sessions.

Address of Chairman.

BY DOUGLASS BURNETT.

The present chairman went into office February 13, upon the resignation of E. L. Callahan. A tremendous amount of work has been done by the Section this year, and the work of the various committees is summarized. The finances of the Section are on a satisfactory basis, due to the adoption of sound principles and business-like conduct of affairs. The Power Sales Bureau of the Section has become of much importance. It is co-operating with the Industrial Power Committee of the American Institute of Electrical Engineers with respect to publishing a handbook of power data. Co-operation has also been undertaken with the National Commercial Gas Association. Steps have been taken to form a separate organization for those connected with the sale of hydroelectric power in the South, and those concerned have been invited to affiliate with this Section. Similar invitations were issued to the Industrial Electric Heating Association. For the coming year it is recommended especially that the work of the Wiring Committee, the Education Committee and the Publications Committee be continued.

Report of Committee on Finance.

BY JOSEPH F. BECKER, CHAIRMAN.

This report shows a surplus for the year 1914 of $2,959.69. This is due largely to the success of the Publications Committee in its sales of publications. The recent constitutional provision allowing to the section $2.50 for each member affiliated with the section has been utilized to cover the expense of publishing and issuing the handbook to new members, but the expenditure is to be kept as small as possible.

Report of Committee on Membership.

BY JOHN G. LEARNED, CHAIRMAN.

As the table of membership by states shows, there is a large increase in the number of new members. One element particularly which has contributed to the success of the committee's work is the large number of section members who have enthusiastically given their time to it. Personal solicitation has proved far more effective than follow-up letters or literature. Consideration has been given to the importance of obtaining central-station men actively engaged in the commercial side of the business as such men immediately become a force in the organization. Central-station companies are already inclined to regard membership as a recommendation when considering promotion to positions of larger responsibility. The slogan for 1913 is repeated; "The more members the more value to each member."

Report of Publications Committee.

BY E. A. EDKINS, CHAIRMAN.

A comparison of commercial section sales for three years, a booklet inventory and the financial statement to February of this year make an admirable showing of the section activities.

The various "campaigns," their purpose and degree of success, are set forth, and the reissue of "Industrial Lighting" with some necessary revision is announced. Too little attention has been paid to the proper lighting of factories, and many factory owners are still "in the dark" on the subject of shop illumination.

The use of Cushing's Manual to get before members without loss of time the data collected since the last publication is explained and justified.

The report closes with a discussion of the question, "Why are 82 per cent of our Class A members not buying the section publications?"

Report of Committee on Commercial Department Terminology.

BY MATHIAS TURNER, CHAIRMAN.

This report gives the results of questions sent out to 16 large central-station companies with a list of standardized titles for various positions in the commercial department. The replies did not indicate any general desire to accept such a list. A table is given of

the titles now in general use. The committee recommends that the association adopt the term "Sales Department" for that department dealing with the company's customers, rather than such terms as "New Business Department," "Contract Department," or "Commercial Department," now used by some companies.

Report of Committee on Typical Power-Sales Development in the West.

BY J. H. M'DOUGAL, CHAIRMAN.

The committee feels that there are few if any installations peculiar to the west alone. However, in selecting from the large amount of material collected, the latest installations of classes of business which are perhaps more fully developed in the west are described. Gold dredging, mining and milling and copper mining and smelting naturally get a good share of attention, but such unusual business as giant powder and rubber manufacturing, sugar refining and wireless telegraphing is described. The points of interest in each installation have been given and while the data are of tremendous value, it is the belief of the committee that the most far-reaching result of the report will be in suggesting new lines of business to follow up.

Report of Committee on Merchandising and Recent Developments in Electrical Appliances.

BY R. R. YOUNG, CHAIRMAN.

This report covers four different phases of merchandising, presenting a study of the subject under the headings "Analyzing the Market," "Factors in Creating a Demand," "Managerial Point of View," "Detailed Handling of Retail Sales," "Campaigns" and "Buying." It also touches on advertising, showing the need of co-operative work between the manufacturers and central-station managers, comparative methods of advertising, value of card file and mailing lists and the cumulative value of advertising. The theory and practical handling of merchandise displays, both in show windows and in interiors, is given in careful detail.

The report considers further the education of the right sales people for adequate representation of the company's policies, as well as their training for volume of sales results.

The especial attention of the Association is called to the suggestions here given for the development of the industrial appliance business. Perfect co-operation between manufacturers and central stations is the first essential. Current revenue will be the increasing reward of the central station in any locality where industrial appliance needs are intelligently interpreted. A list of some successful installations of standard appliances is given.

The committee has made a study of recent development in all electrical appliances, getting central station suggestions for improvements on standard appliances, and manufacturers' ideas as to present efficiency and prices, and future development and prices. These ideas are listed.

The report includes also a list of available electrical apparatus for various industries, a directory of electric appliance manufacturers, various forms and outlines, and a bibliography of sources of information on all subjects of the report. It also includes a list of books which should be helpful.

Report of the Lamp Committee.

BY FRANK W. SMITH, CHAIRMAN.

The report in its introduction reviews the work of the committee, particularly with respect to direct contact throughout the country with member companies.

Lamp sales are shown to have fallen off over the preceding year (1913) owing to disturbed conditions, whereas the increase over 1912 was 11 per cent. The Mazda lamp now totals over 70 per cent of the domestic lamp sales or two and one-third times the sales of all other lamps combined. By reference to table and curve presented within the report, the general trend of lamp sales may clearly be observed.

Under "Development" the committee has treated rather fully the important steps and progress made by the manufacturers throughout the year, including description and illustration of new shapes for bulbs, ventilation, efficiency, mounting of tungsten filament in vacuum lamps and other details. New types of lamps standardized since May 1, 1914, are listed in full. Lamp prices are shown to have been reduced from time to time.

A brief but interesting paragraph with curves illustrating the point shows the per cent reductions that have taken place in the cost of electric illumination over a period of 20 years.

Municipal street lighting with the Mazda C lamp is treated at some length, the report showing a considerable increase by central-station companies in this class of business with the new illuminants. An interesting device for calculating life under this heading is illustrated and described, as are a number of commercial applications of the Mazda C lamp.

The question of fixtures now available for the higher-efficiency lamps is treated at length and in detail.

New uses that have been developed for incandescent illuminants with the introduction of the higher-efficiency lamps, are described, and reference is made to certain publications under this heading.

The committee then treats the subject of standard voltage and the matter of company lamp policy. Central-station companies should seek to continue their supervision over the lamp situation for the protection of their customers.

Report of Committee on Rate Research.

BY R. S. HALE, CHAIRMAN.

The first part of the report gives a brief review of the methods and principles by which member companies have in the past developed the broad outlines of their now existing rates, beginning with the street lighting rates, then following with store and house lighting rates, rates for power, wholesale rates, rates for ice making, heating, charging batteries, etc., showing how each rate has been developed so as to obtain the business of a new class of service that could not afford to take electricity at the old rates. In each case the new rate for the new class of business, although lower than the rates to the business already supplied, gave a profit over the increment costs which led to a general reduction of all rates.

The Wright, Hopkinson and Doherty theories, while extremely useful, have not given a complete solution of the problem.

Six general principles appear, consciously or unconsciously, to have been followed in obtaining the present rates. Briefly stated, these are to the effect that rates should in no case go below bare cost or increment cost, while, on the other hand, if any section of the rates is placed so high that it discourages business the class that would otherwise be served pays nothing toward expenses, and, finally, between these limits the lowest rates to all are obtained by considering "value-of-service" while taking care that the total rates shall not give more than cost plus a fair profit on the whole investment.

The possibility that the rapid increase in efficiency of lamps may make a change in rates necessary is discussed. Attention is called to the various detail questions that are coming up from time to time before courts and commissions, and to the general soundness of the decisions of commissions on these various points, even when they have been asked to consider calculations based on theoretical costs that would give higher rates than those that would really develop the business. The committee calls attention to its reports of past years, but has not considered it desirable this year to make any further changes in its proposed standard forms and wordings.

The financial condition of the publication, *Rate Research*, is given, with a recommendation that this be continued for the present, and the report concludes with the recommendation that as the principles of rate-making appear to be well established, as far as the practice of the companies and the decisions of commissions are concerned, the committee itself be either discontinued or continued merely for the purpose of publishing *Rate Research* and placing before the Association the various decisions and reports of commissions, with the idea that the executive committee can reappoint or appoint a new committee should any special development warrant it.

Report of the Power Sales Bureau.

BY C. J. RUSSELL, CHAIRMAN.

This report reviews the work done by the Power Sales Bureau since its organization at the Philadelphia convention.

The details of the subdivision of the work among 17 main and 29 sub-committees are given. The efforts being made to avoid duplication of work and to effect co-operation on the part of the Power Sales Bureau and other committees of this and other associations are set forth.

Details are given as to the work of standardizing the collection of statistics and data and the establishment of a clearing house at headquarters for handling this work. Recommendations are made for extending the usefulness of the Power Sales Bureau and for co-operation between the Power Sales Bureau and the committee on electrical salesman's handbook.

The Commercial Application of Electric Resistance Furnaces.

BY C. W. BARTLETT.

The commercial applications are divided into four classes, each having a definite temperature range, and typical operations are specified for each class.

The operation of the resistance type of furnace is described and details given in regard to the methods used to automatically hold the temperature con-

stant. The article presents in detail the marked improvement which can be made in quality of product by the application of the electric resistance furnace in place of other types used for similar work, and points out definitely the opportunities which electric furnaces offer as desirable new load builders.

Tabulated data are presented showing analysis of the atmosphere in the heating chambers and the amount of current consumed for specified outputs. The paper is illustrated by means of charts, diagrams and half-tone reproductions.

A Stassano Furnace Installation at Redondo, Cal.

BY W. M. M'KNIGHT.

In the advancement of the application of electrical energy to new purposes the electrical furnace offers an interesting study and gives promise of a wide field of usefulness.

The first Stassano arc furnace installation is described and the conclusions drawn from a close study of one large plant for around 20 months are set forth in interesting detail with five illustrations.

The distinguishing feature of this furnace is fusion by radiant heat from an electric arc, from two to three inches above the metal and approximately 24 inches from the roof of the furnace, in a closed chamber with neutral atmosphere, for the chemical reactions which take place in the process of refining.

Furnace suspension, tiling, metering and switch protection are described, the products are listed, and a full discussion of electrodes, their size, placing and efficiency is had. The argument is made that for one entire class of work the electric furnace is already beyond the experimental stage, and its value and merit as a great current-consuming commodity are established.

Electric-Furnace Power Loads.

BY F. T. SNYDER.

Electric furnaces at present use a million electric horsepower. This load is now entering upon a period of rapid growth. The principal developed fields are in the melting of metals, especially steel, and in high-temperature chemical work. The load-factor, peak time, voltage and frequency make this load suitable for central-station service.

It has been found that single-phase furnace loads can be obtained more readily than three-phase loads. This is due to the lower cost of operation of single-electrode furnaces. Part of the energy in an electric furnace is absorbed at 100-per-cent efficiency by the material under treatment, and is removed from the furnace with the material. In addition to this a considerable amount of energy is lost in radiation and conduction. This heat loss, the refractory and electrode consumption and the furnace labor increase with the number of electrodes used.

Commercially, electric furnace loads develop most rapidly with single-phase furnaces, just as street-car loads have developed most rapidly with direct current. The power companies can bring about the growth of this furnace load speedily by arranging to supply single-phase service.

Demonstration of a Power Sale.

BY C. H. STEVENS.

The object of this paper is to develop some suggestions in handling power sales work by giving an analysis of one complete power sale.

The subject being broad, it is attempted to give only a general outline of the course pursued in a typical proposition which embodies as many phases of the work as are usually found in one transaction and deals principally with the methods followed and some of the principal arguments advanced.

The first part of the paper outlines a typical organization to handle the work and its general equipment, and then shows the course pursued when the lead is first received, and how the salesman after some difficulty with the architects and owners, obtains permission to test their present plant and to submit a proposition for operating on central station service. The result of the test made is shown and a typical proposition is presented.

Then follows the adverse report made by the consulting engineer on the proposition and finally the arguments which the salesman presents to refute these criticisms and to convince the owners that central station service will prove more economical than the private plant.

Technical and Hydroelectric Sessions.

Report of Committee on Meters.

BY C. G. DURFEE, CHAIRMAN.

The energies of the Committee on Meters have been mainly devoted to the revision of the "Electrical Meterman's Handbook," which revised edition has been printed for distribution at this convention. The balance of the report covers in brief some methods of testing instrument transformers, some additional shunt standardization data and some notes on ampere meter tests, meter jewels and public utility regulations. A chapter is devoted to new demand instruments and the recent developments in meters, instruments and auxiliary devices are briefly described.

Report of Committee on Electrical Apparatus.

BY L. L. ELDEN, CHAIRMAN.

The report reviews the prevailing conditions in the development and application of electrical apparatus during the year and covers the following subjects: Alternating-Current Machines, Substations, Transformers, Synchronous Converters, Synchronous Condensers, Rectifiers, Railway Developments, Lightning Arresters, Oil Switches and Circuit-Breakers, Instruments, Large-Capacity Direct-Current Circuit-Breakers, Temperature Measurement, Multi-Recorder, High-Frequency Oscillation for Testing Transformers, Feeder Regulators, Alternating-Current Network Protector, Polyphase Adjustable-Speed Motor, A. I. E. E. Standardization Rules, Service Requirements for Motors, Standardization of Instrument Shunts, Switchboard Manual.

Touching upon developments in apparatus in a general way, there are recorded some examples of recent construction which were worthy of note from the point of view of size and capacity. Portable and automatic substations have reached a stage of application which forces recognition of their economic advantages in many situations.

The introduction of the phase advancer as a piece of auxiliary apparatus performing the same functions as synchronous condensers in connection with inductive motor loads, is a departure of great moment. While condensers serve primarily for regulating a complete installation, the advancer provides economical means for regulating the power-factor of an individual motor, an adaptation which is feasible in many cases where trouble is now experienced with motors developing inductive loads. Later experiences with synchronous converters lead the committee to recommend the use of electrolytic arresters and suitable methods of grounding converter frames for the protection of both operators and apparatus.

Automatic oil-type circuit-breakers continue to be a very important feature of central-station equipment, requiring the most careful attention to be maintained in condition to perform maximum service. Convenient arrangements for handling and repairing such switches are described in the report, as well as brief reference to certain changes in the design of tripping attachments intended to remedy recently observed defects in oil switches. Instruments and relays of the later types have been considered and reference made to their more important characteristics.

Systematic testing of porcelain insulators is now recognized as desirable for the purpose of eliminating defective material in advance of actual failure. The high-frequency oscillation method of testing porcelain is described and the results of its use recorded.

Protective and regulating devices for alternating-current distributing networks include the alternating-current network protector and feeder regulators, both of which are commented upon as a result of the year's experience with the devices as now developed.

Considering the standardization of the requirements of the various companies governing the connection of motors to their lines, after a careful investigation of the rules now in force, it seems entirely feasible to suggest modifications of the rules of certain companies to conform with those of the majority and thereby simplify the problems of manufacturers and distributors of standard commercial motors. It is believed that this is a matter of considerable benefit to both manufacturer and user.

The committee has prepared a "Switchboard Manual," which is intended to act as a guide in the selection of switchboards and instruments, especially in the smaller companies, where trained men in this work are frequently not available and where employees depend largely upon the advice of the manufacturer's agents in their purchases of switchboard apparatus.

The Application of the Diversity-Factor.

BY H. B. GEAR.

Diversity-factor reduces the amount of capital required to carry on a busi-

ness, and by increasing the load-factor makes it possible to produce a greater income per dollar invested. The load-factors and demand-factors of various classes of consumers, compiled by E. W. Lloyd in 1909, are discussed, and a series of tables showing group diversity-factors and daily diversity-factors show the relations between group diversity-factor and group load-factor. The wrong use of load-factor and individual diversity-factor are illustrated. The paper closes with an example of the application of the principles elaborated to investment.

Report of the Hydroelectric and Transmission Committee.

BY M. R. BUMP, CHAIRMAN.

This committee, organized to carry out the work of the former hydroelectric and transmission section, has spent most of its year in outlining plans which it recommends to the Association for future activities. The control of the attitude and actions of the Association in respect to water-power legislation is wisely placed in the hands of the Public Policy Committee. On account of the unsettled conditions surrounding the water-power industry, it was felt unwise to attempt a compilation of existing state and federal laws, and it is to be regretted that the present year has not resulted in any definite settlement of the water-power question. Special attention is called to the report on progress, and to the report of the special committees on the development of water powers on the Pacific Coast. Special committees, reports from which will be presented at this convention, were appointed to consider overhead transmission problems, the care and operation of high-tension apparatus, and the electrification of steam railroads. The committee earnestly recommends that the further prosecution of these subjects be carried on, and that in addition, other committees, such as a special committee on off-peak load and a committee on receiving apparatus, be appointed at an early date.

Report of Committee on Prime Movers.

BY I. E. MOULTROP, CHAIRMAN.

Steam Power.—Marked improvements have been made in condenser design during the past year, and statements are submitted from three of the leading manufacturers. Two new stokers of the underfeed type for high capacity with abilty to satisfactorily handle high-grade eastern coals are described. The development of the steam turbine is outlined in articles from the two leading manufacturers. Attention of the members is called to the possible danger to steam boilers by using carbonate of soda as a water purification compound. Brief mention is also made of the following subjects: econmizers, coal-dust burning, fusibility of ash, air leakage in boiler and economizer settings, instruments for checking boiler performance, improvements in older types of condensers, new method of determining condenser leakage and air cleaning for turbo-generators.

Water Power.—Following their established custom, the committee has limited this year's report to a few subjects, part of which are covered by special papers. As the numbers of papers which can be introduced at the convention is limited, it has been necessary to present some of this material in the form of an appendix to the report. Reference is made to three recent notable water power developments typical of high, intermediate and low-head practice, respectively.

The following subjects have been taken up: recent progress in water-wheel design; governors—open versus closed-type oil-pressure systems; governor-effort analysis; practice in high-head hydraulic plants; methods of water measurement.

The last two subjects will be covered by two of the convention papers. Abstracts of these papers are given in the text of the report.

Gas Power.—A complete statement is given of the fuel-oil production and probable supply in the United States and Mexico, which indicates that there are vast quantities of this valuable fuel available. The progress of the development in this country of the Diesel engine is outlined and a brief paragraph covers the progress of the American Humphrey Pump. The Committee finds much activity in the Diesel engine work and good evidence that the American manufacturers are now working on rational lines. The gas engine is found to be little changed from last year, as well as the American gas producer. A most valuable letter from Prof. R. H. Fernald is attached, which gives in concise language the producer situation in the United States and also a very complete summation of the European practice in producer work. It would seem that European engineers have made much progress in perfecting the producer.

Practice in High-Head Hydraulic Plants.

BY J. P. JOLLYMAN.

The paper deals with the features of high-head plants, which pertain to the control and utilization of water under high pressure. The design and operation of pipe lines, also the types of water wheels and their limitations are considered. The general arrangement of high-head plants is discussed. Data pertaining to several typical high-head installations of Francis turbines and of impulse wheels are given.

An Analysis of Water-Wheel Governor Effort.

BY E. D. SEARING.

Following a disastrous accident caused by the running away of water wheels, the problem of analyzing governor control was taken up by the Portland Railway, Light and Power Company and an interesting series of experiments made, a resumé of which is given in the paper.

The company decided to undertake a study of the work required of the governors in order to determine, if possible, the cause of the trouble. A preliminary study of the operating features lead to the belief that the governors were not of sufficient capacity to perform satisfactorily the work of regulating, in addition to that of overcoming the friction and unbalance of the gates. The problem became, first, one of analyzing the governor effort. Three existing methods were tried and discarded. It was then that original work was undertaken with most satisfactory results. Steam-engine indicators were connected to each end of the governor cylinder of the water-wheel unit to be investigated, and continuous records of the varying pressures from each side of the governor piston throughout one cycle of operation were obtained. An analysis of effort of separating friction and unbalance was made; the rise of pressure in wheel casings, high pressures in governor cylinders, over-speed devices and the wicket gates themselves were thoroughly studied. Some formulas and many illustrations are given.

All methods heretofore employed to analyze governor effort have given results of limited value. The expedient of employing indicators and the method derived from analyzing the results outlined in this paper, are adaptable in determining the effort of any hydraulically operated governor, and are believed adequate for treating all phases of the subject.

Oil-Burning Stand-By Plants.

BY C. H. DELANY.

The operation of steam plants used as stand-by in connection with hydroelectric systems is discussed, and the features wherein an oil-burning stand-by plant differs from a coal-burning plant are pointed out.

Stand-by plants have very different functions on different systems. These are discussed in connection with the use of coal and oil as fuel. An oil-burning furnace is described in some detail and its advantages and disadvantages stated. Perhaps the greatest advantage in the use of oil as fuel is the rapidity with which fire can be started. Some facts are given. The three plants of the Pacific Gas and Electric Company are analyzed and their operation discussed. Boilers of different makes and their action in service are described and tabulated.

The paper closes with a discussion of the turbine and its auxiliaries—the largest expense in the operation of these plants. It becomes evident under the analyses given that if it were not necessary to keep the turbine in operation the cost of operating the plant could be greatly reduced. Assuming, however, that the turbines must be kept operating at speed certain economies can be effected by installing apparatus suitable for this type of service.

Continued watchfulness in the boiler room is essential to secure the highest efficiency. This is true in an oil-burning as well as in a coal-burning plant, in a stand-by as well as in a plant that operates continually. Stand-by losses become, under certain conditions, the real station losses.

Electric Line Distribution Conditions in the Pacific Northwestern States.

BY J. C. MARTIN.

The East is densely populated and in an advanced and well established stage of development. The West is sparsely settled and in an active and in many cases pioneer stage of development. In the East electrical service is a matter of economy and convenience and the primary requirement is good service; in the West electrical service is a necessity to the development of the region, particularly in irrigation districts, and the important requirement is low-cost service. In the East fuel is cheap. In the West expensive fuel renders the development of the water-power resources necessary.

Early development of the electrical industry was along low-voltage lines in densely populated districts. Rapid development to higher voltages was forced by increasing load conditions.

Available water-power resources of the West and need for power induced development of high-tension equipment. Impossibility of serving sparsely populated territory with distribution lines of low voltage made necessary the development of equipment for high-voltage distribution service. Distribution voltages up to at least 15,000 volts are necessary at the present time.

The intention of the overhead line committee was to formulate specifications that would be of assistance to the industry. Mandatory enforcement was not anticipated. The specifications reflected current eastern practice. Western conditions were not developed and lines along which satisfactory specifications could be drawn were not known. The specifications were accepted and used by various interests and regulatory bodies as official, and attempts were made to write them into state laws or regulations. Specifications of some character have been adopted by the states of Oregon, Washington and Idaho.

The crossing specifications have been the real point of attack, especially the 1911 crossing specifications. The first specific objection and the most serious is the 5,000-volt limit. When established practically all distributing systems in the United States were under that voltage. The enforcement of the rules on systems of over 5,000 volts would prohibit the use of such distributing systems. Some requirements would entail unnecessary expense, notably the requirement of a minimum of No. 4 stranded wire on crossings. The cost of complying with specifications is a considerable item. Examples of conditions faced are given. Experience has not shown these requirements to be necessary.

Report of High-Tension Transmission Sub-Committee of Hydroelectric Committee.

BY R. J. M'CLELLAND, CHAIRMAN.

Of the problems before electric transmission and distribution systems, probably the most important and urgent are not technical but concern certain aspects of the attitude of the public toward its utilities. Public regulation and semi-public standardization of the construction practice and operating methods of electric-transmission systems are in an active and formative stage, and the report calls attention to two important questions of public policy which are involved in these general problems of public regulation and standardization.

The first is the difference in physical and economic conditions, and in requirements as to service and hazard between densely populated, highly developed regions and sparsely settled regions in an active stage of development, particularly in the West and South. It appears inevitable that broader consideration than in the past must now be given to the significance of these differences, and to the corresponding need of a difference in economic and engineering practice, in the interest not merely of the electric power industries, but of the districts served by the industries.

The second question is that of inductive interference between power lines and telephone or other communication lines. There are many technical and scientific problems involved, but of more immediate importance and more general interest is that of a line of public policy, according to which the interference between the two utilities may be adjusted. The California Railroad Commission has recently adopted an elaborate set of rulings covering the question of inductive interference, and these rulings, owing to their importance as precedents and to the startling character of certain of their provisions, have been regarded with grave concern by the power companies in other parts of the country.

Both of these questions are likely, in the very near future, to be of direct personal interest to most of the companies operating overhead electric lines, and it is important that their significance and the full effect of the various proposed standards be appreciated.

Report of Sub-Committee on High-Tension Apparatus.

BY W. N. BYERSON, CHAIRMAN.

It is suggested that a manual covering installation and operation of high-tension apparatus be prepared, this work to cover everything from low-tension oil switches of transformers to low-tension switches in substations. A list of the important points to be covered by future committees in carrying on this work makes clear the great diversity of subjects to be taken into consideration and the need of a systematic and uniform system of compiling the data.

Report of Committee on Terminology.

BY A. S. M'ALLISTER, CHAIRMAN.

Since the last convention of the National Electric Light Association the Standards Committee of the American Institute of Electrical Engineers and the Committee on Nomenclature and Standards of the Illuminating Engineering Society have submitted reports relating to subjects in which the National Electric Light Association is much interested. In view of the desirability of having all associations dealing with electrical and illumination matters to agree as to terms and definitions, the present National Electric Light Association Committee on Terminology has selected certain definitions from the reports of the other committees, arranged them in logical order and edited them to avoid any appearance of conflict. The report represents largely a presentation to the National Electric Light Association for official confirmation of terms and definitions selected from reports of committees of other organizations in which the National Electric Light Association was represented either officially or unofficially.

Report of Committee on Street Lighting.

BY JOHN W. LIEB, CHAIRMAN.

This report presents a digest of the information made available through the investigation of street illumination which has been conducted in New York during the past year. It contains a statement of the illuminating efficiencies of street illuminants as made available through the courtesy of the Lamp Committee of the Association of Edison Illuminating Companies. In addition there is a report from the committee to the member companies on the manufacturers' development policies in the field of the incandescent and the arc lamp, particularly of the gas-filled tungsten lamp.

Report of Committee on Underground Construction.

BY PHILIP TORCHIO, CHAIRMAN.

Section A.—Manhole and Conduit Construction.

Extent of Underground Construction and Characteristic Practice in the United States.—The companies reporting, probably representing 75 per cent of the amount of underground construction, had a total of 100,862,587 duct-feet used for electric lighting purposes. Of this amount 44 per cent is occupied. There is shown a greater difference in practice than appears to be justifiable for many items, such as transmission voltages; sizes of cables; connection of transformers in multiple or singly; interconnecting of high-tension distributing feeders; use of disconnecting potheads, fuses, switches, etc.; voltages and phases of low-tension distributing systems; sizes of neutrals; junction-box fuses; variety of materials used in ducts, etc.

Low-Cost Underground Distribution System.—In all these systems the initial expense involved in preparing the trench is a substantial portion of the total expense. A drawing-in system, with the omission of manholes and handholes, would not be materially different in cost from a solid system employing armored cable, and it might prove to be preferable.

Ventilation and Maintenance of Manholes.—To eliminate unhealthful working conditions in underground systems, provision should be made for cleaning manholes at regular intervals, maintaining, if necessary, a regular inspection and cleaning division with suitable pumping and ventilating equipments.

Design of Transformer Manholes.—The natural heat radiation of manholes will usually dissipate the losses of 100-kilowatt transformer equipments. Temperatures of 110 to 120 degrees Fahrenheit are to be considered normal. Separate transformer manholes are preferable for large installations. Several precautions are recommended.

Heating of Duct Lines and Its Effect on High-Tension Cables.—The heating due to losses in high-tension cables may be caused by the copper losses and the dielectric losses. The latter, with some compounds, may be a great portion of the total, causing reduction of cable capacity. Recommendations for the construction of duct lines to provide liberal radiation are given.

Manhole Fires.—To prevent disastrous fires the committee recommends the bonding of lead sheaths of all cables in each manhole and the protection of cables by means of reliable fireproof covering, and discusses the merits of different materials used. There is a divergency of opinion regarding the desirability of sealing the ducts in manholes. The subdivision of conduit lines is recommended.

Standard Subway Specifications.—To comply with the several requests of member companies a standard form of subway specifications is given, with some introductory explanations.

Section B.—Cable Data and Protection.

Heating of Sector Cables.—Sector cable for the same cross-section of copper has the greater carrying capacity. The saving in cost for the same copper cross-section is not material, but because of greater carrying capacity the saving becomes noticeable. Its main advantage, however, is to make possible the installation of a cable of greatly increased carrying capacity in a duct of given dimensions.

Protection of Transmission Systems.—Protective reactors on feeders are recommended. The grounding of the neutral and the use of arcing ground suppressors are discussed. The satisfactory operation of some large systems without the grounded neutral compels the committee to refrain from making definite recommendations.

Asbestos Cable Coverings.—The effect of stray currents of cable sheaths protected by asbestos coverings in manholes leads the committee to recommend the discontinuance of the use of asbestos coverings, especially in damp locations.

Cement Mortar Cable Protection.—The chemical action of cement mortar coverings on cables is discussed.

Varnished-Cambric Cable for Subway Transformer Connections.—One company had failures, but the committee's investigations did not bring out confirmation of these troubles. More information is requested.

Section C.—Equipment, Devices, Etc.

Junction Boxes for Low-Tension Systems.—Types of surface boxes are discussed in contrast with the manhole type of box and many advantages are shown in favor of the surface box located in a hole separate from the manhole.

Labor-Saving Devices.—A pipe-forcing jack to install service pipes under cement sidewalks and paved highways is suggested. A number of other labor-saving devices are described.

Safety Devices and Tools for Underground Work.—A complete description is given of the best methods and devices used in underground work to eliminate accidents and facilitate the work of installing, testing and maintaining underground systems.

Report of Accident Prevention Committee.

BY M. J. INSULL, CHAIRMAN.

This report consists of a list of rules for the employer and the employee, based upon a conference with the United States Bureau of Standards, which has issued a set of safety rules. These rules were presented to the convention for approval.

Accounting Sessions.

Some Opportunities of Public-Utility Accountants.

BY L. R. REYNOLDS.

The great object of a uniform system of accounts, is, course, to make comparable all the transactions of all utilities of a certain class, and to this end instructions must be such that there can be no deviation. The Interstate Commerce Commission has recently prepared supplements to some of its classifications in the form of indexes to the operating expenses. A state commission is not able to prepare such an index for each of the many classes of utilities under its jurisdiction, but it should be comparatively easy for the accounting members of an association of this kind, through their every-day experience in this one particular class of utility, to prepare such an index, and if this were done a very strong plea for its adoption into a National System could be made.

Some paragraphs of the National Electric Light Association classification of accounts are analyzed. Depreciation and appreciation are discussed.

One of the most important divisions of an accountant's work consists of setting up upon his books the true cost of his company's construction, and thereafter correctly differentiating between new construction and operating expense and other charges to profit and loss.

The books and records of a company are its vital history. Commissions should never hear the remark—"That it is merely a book value, and has no relation to the true value of the property." A company in obtaining authority to issue securities should be able to point to its records and say: "There is the cost of our property in detail."

The accountant is in the best position of any officer of a corporation to know its obligations, and it is his duty to see that reserves are provided for all contingencies.

Workmen's Compensation Insurance.

BY WALTER G. COWLES.

This paper dealt with the claims of stock insurance companies as against mutual or self-insurance. The stock-insurance system furnishes the only reliable means for reducing future losses to present fixed values. The stock company has its subscribed capital and surplus to provide for unexpected or unusually large losses. Variations in experience are thus provided for in advance. This element of financial strength and distributive ability is found only in this system, and it is only here that a fixed price can be obtained. Under compensation practice policies are unlimited in amount, but with stock companies there are no assessments and no dividends. The policy holder is not in partnership with the insurance company, and does not share its risks. The premium is computed from the pay roll and varies as operations increase or decrease. Distribution of risk is always wider with stock insurance. The payment of a mutual premium does not discharge the obligation. On the contrary, it binds to new and perhaps increased obligations, as the policy holder becomes a partner. The payment represents a liability rather than an asset. Mutual insurance is fundamentally unfitted to compensation obligation. It is useful in other lines, but only where liquidation immediately follows loss. This is not the case in compensation insurance, as deferred payments may be made for a term of years, and the actual cost cannot be known until the end. It can only be estimated. An estimate of deferred obligations is customaily insufficient. The inability of mutual concerns to provide adequately for deferred claims has long been recognized in Germany, and it is not attempted there. Premiums are levied for current payments only, and deferred payments become charges upon future enterprises. Trade mutual-insurance companies bear about the same relation to stock companies as private or neighborhood electric light plants bear to central stations. Reference is made to malingering, and the necessity for investigation and continual watching of the recipients of payments. A study of experiences in England and Germany is given to show the advantage of stock insurance in England, as compared with trade associations under government control in Germany. The English expense ratio is somewhat higher, but there is greater efficiency and few claims per 1,000 insured. It is erroneous to suppose that rates charged by stock companies are excessive. The cost of compensation grows amazingly from year to year in most industries, but the electric light business is an exception. Rates are based on the best experience obtainable. The money made by insurance companies does not usually result from profits due to excessive rates, but from the interest upon invested capital and advance premiums, which are handled as in a banking business. Of the 33 to 40 per cent expense portion of the gross premium, agency costs take about 17.5 per cent; inspection service, 3.5; pay-roll audits, two; taxes, two; collection expenses, five per cent. The objections to mutual insurance are even more applicable to self-insurance.

Electric-Vehicle Cost Accounting.

BY W. P. KENNEDY.

Without imposing restrictions upon individual preference the paper discusses the general subject of electric vehicle accounting and offers many definite statements concerning the practice of several companies doing a large business. Reference is made to the many reasons for uniformity, in order that there may be a common basis for making comparisons. Two schedules, A and B, are presented and are analyzed and proved to be applicable to the affairs of either large or small companies. The idea is developed that in the interest of accuracy there should be as few as possible charges requiring daily records from garages.

Analytical Accounting for Central-Station Companies.

BY O. B. CALDWELL.

The test of the value of the system of accounts is obviously the extent to which the management can from it obtain necessary information. There is an increasing tendency on the part of those handling business enterprises to anaylze the methods employed, ascertain the sequence of operations when the processes are complicated, study the number of such operations for the purpose of eliminating those which are unnecessary, and, in general, to know more about the business and the cost of the articles manufactured. Classifications as made at the present time do not adequately provide the information needed for a complete anlysis of the business of a utility.

A study of the sequence of operations covering the five steps common to all central-station business is made and illustrations given. Finally these classes of service appear under utilization, where are added the expenses occasioned by the utility equipment, the commercial and the general expenses, all of which are suitably apportioned to these classes and to the direct users.

E. N. Strait on "The Wisconsin Railroad Commission's Method of Rate-Making" and Arthur S. Ives on "Factors in Rate-Making," are quoted.

A post mortem of the activities of a utility is interesting and of some value, but it is better to establish systems of analytical accounting that will enable us to determine costs as we go along. It is essential that the efforts of all public utility companies be concentrated on the subject in order that substantial progress may be made.

Electrical Engineering Problems.

By R. G. Hudson and W. V. Lyon.

Problem 40. DIRECT CURRENTS.

The specifications for wiring a machine shop call for electrical connections between a service panel and four motors designated as A, B, C and D. The motors are 220-volt direct-current compound-wound machines and are rated as follows: A, 25 horsepower at 94 amperes; B, 10 horsepower at 38 amperes; C, 40 horsepower at 150 amperes; and D, 30 horsepower at 113 amperes. The voltage at the service panel is 230 volts and the voltage at each motor is not to be less than 220 volts at full load.

All wires are to be laid in rigid conduit and the wiring distances from the panel to the motors are as follows: A, 200 feet; B, 300 feet; C, 150 feet; and D, 100 feet. The cost of two rubber-covered wires and conduit per 100 feet for various standard sizes of wire is approximately as follows:

Size of wire.	Cost per 100 feet.	Size of wire.	Cost per 100 feet.
14	$ 6.82	3	$24.40
12	8.68	2	28.40
10	9.52	1	33.80
8	13.40	0	42.50
6	16.20	00	47.40
5	20.70	000	53.60
4	22.50	0000	60.90

In previous work of similar character the contractor finds that an electrician (55 cents per hour) and a helper (30 cents per hour) can install 30 feet of conduit per hour, including the drawing in of wire and setting of outlet boxes. Previous business indicates a "material overhead" of $5.00 per $100 paid out for material and a "labor overhead" of 20 cents per man-hour. If the contractor is to make a profit of 15 per cent, what amount should he bid on this job, if the service panel and switches cost $30.00?

SOLUTION OF PROBLEM 40.

The length of wire from the service panel to motor A and back again is 400 feet. The current at full load is 94 amperes and since the voltage drop is not to exceed 10 volts, the proper area of the wire is given by [24]

$$A=10.6\times400\times94/10=40{,}000 \text{ circular mils.}$$

Referring to a copper wire table (See Problem 4) it is found that the nearest larger size of wire is a No. 4. This size must now be checked for current-carrying capacity. The National Electrical Code prescribes that motor leads shall be able to carry a current 25 per cent in excess of the rated current. In this case the motor leads must carry 1.25×94 or 117.5 amperes. Referring again to the wire table, it is found that for rubber insulation, a No. 0 wire must be used.

By the same process of reasoning the proper area of wire for motor B from the standpoint of voltage drop is found to be

$$A=10.6\times600\times38/10=24{,}000 \text{ circular mils,}$$

and from the wire table the nearest larger size wire is No. 6. The motor leads must carry 1.25×38 or 47.5 amperes. A No. 6 wire then fulfills all the requirements of motor B.

For motor C

$$A=10.6\times200\times150/10=48{,}000 \text{ circular mils,}$$

and from the wire table the nearest larger size of wire is No. 3. A No. 0000 wire must be used, however, since the motor leads must carry 1.25×150 or 187.5 amperes.

For motor D

$$A=10.6\times200\times113/10=24{,}000 \text{ circular mils,}$$

and from the wire table the nearest larger size of wire is No. 6. A No. 00 wire must be used, however, since the motor leads must carry 1.25×113 or 141 amperes.

From the cost data given in Problem 40 the cost of wire and conduit for each motor will be as follows:

Motor A	2×	$42.50=$85.00
Motor B	3×	16.20= 48.60
Motor C	1.5×	60.90= 91.35
Motor D	1×	47.40= 47.40
		$272.35
Cost of service panel		30.00
Total cost of material		$302.35

The total length of the conduit to be installed is 200+300+150+100=750 feet. Since 30 feet of conduit are installed per hour, the time required to complete the installation is 750/30 or 25 hours. The labor cost is given by

Electrician	25×$0.55	=$13.75
Helper	25× 0.30	= 7.50
Total cost of labor		$21.25

The "material overhead" charge equals 3×$5.00 or $15. The number of labor man-hours being 50, the "labor overhead" charge is 50×$0.20 or $10. The total cost of the installation may then be summarized as follows:

Material	$302.35
Material overhead	15.00
Labor	21.25
Labor overhead	10.00
Total cost	$348.60
Adding 15 per cent profit	52.29
Total charge	$400.89

The contractor should then bid $401.

SOLUTION OF PROBLEM 90.

Part I. Answer to Question a.

It is only polyphase circuits, such as are described in this problem, which have no mutual inductance or mutual capacity that can be solved in a simple way when the voltages acting are non-sinusoidal. When the circuits have mutual inductance, as do the windings of a three-phase synchronous generator or motor, the solution is quite difficult and is rarely attempted. In the present problem the method employed is based on the principle stated in Problem 89 that a voltage of our frequency has no effect on the value of the current produced by the voltage of a different frequency.

The armature windings of a three-phase generator are so arranged that the phase relation between the fundamental components of the phase voltages is 120 degrees. This is also the relation between all of the odd harmonics in the phase voltages except the third and its multiples. In a polyphase machine as ordinarily constructed there can be no even harmonics in the voltages. The third harmonic components and all multiples of the third, *i.e.*, the ninth, fifteenth, twenty-first, etc., are in phase with one another. In Fig. 45a the fundamental components of the phase voltages are E'_{ca}, E'_{cb} and E'_{cc}. They are equal in magnitude but are displaced 120 degrees in phase so that the voltages across the terminals of the generator are E'_{ba}, E'_{cb} and E'_{ac}. In magnitude these line voltages are $\sqrt{3}$ times the phase voltages. This relation of the magnitudes of the

ALTERNATING CURRENTS.

Problem 90. Part I.

Three equal circuits each of which consists of an air-core reactor in series with a condenser are connected in star across the terminals of a three-phase, 60-cycle generator. The reactor has a resistance of 20 ohms and an inductance of 25 milhenrys. The condenser has a capacity of 30 microfarads. The armature windings of the generator are connected in star, and an analysis of the phase voltage shows that it consists of a fundamental with a maximum value of 150 volts, a third harmonic with a maximum value of 50 volts and a fifth harmonic with a maximum value of 40 volts. The higher harmonics are too small to consider. (*a*) What will a voltmeter indicate that is connected across one phase of the generator, *i. e.*, from line to neutral? Across the lines? Across one phase of the load, *i. e.*, from line to the neutral of the load? (*b*) What will a voltmeter indicate that is connected between the neutral point of the generator and the neutral point of the load? (*c*) What are the voltages across each reactor and across each condenser? (*d*) What is the line current? If the output of the generator is measured by the two-wattmeter method, what will be the sum of the wattmeter headings? Is this the output of the generator?

Part II.

The neutral point of the generator is now connected to the neutral point of the load. Assume that this does not alter the phase or the line voltages of the generator. (*a*) What is the line current? (*b*) What is the current in the conductor connecting the neutral points? (*c*) What are the voltages across each reactor and across each condenser? (*d*) If the wattmeters are still connected as in Part I, what will be the sum of their readings? (*e*) What is the total output of the generator?

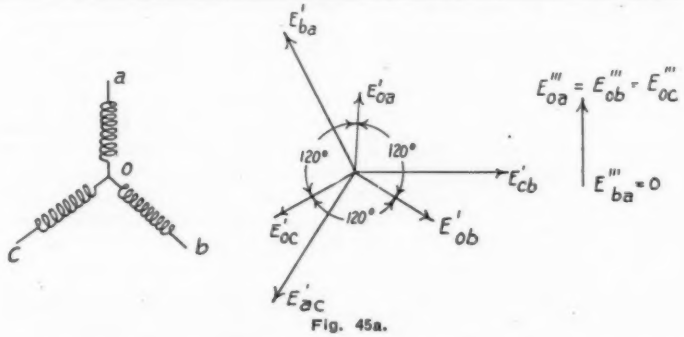


Fig. 45a.

phase and line voltages also holds for all of the odd harmonics except the third and its multiples. The third harmonic components of the phase voltages, E'''_{oa}, E'''_{ob} and E'''_{oc} are all in phase, so that the line voltage, E'''_{ba}, which is the difference between the phase voltages E'''_{oa} and E'''_{ob}, is zero. Thus any instrument that is connected across the line terminals of a three-phase, star-connected alternator will fail to show any third harmonic component in the voltage even if such a component exists in the phase voltage. If the phase windings are connected in delta, the third harmonic components in the generated phase voltages, being in phase, would be short-circuited in the winding itself, and so would not appear at the terminals of the machine. For this reason a generator which is to be delta-connected should be designed so that there is not more than a very small third harmonic component in the phase generated voltage.

A voltmeter connected across the phase terminals of the generator will indicate

by [44a] $E=\sqrt{150^2+50^2+40^2}/\sqrt{2}$
$=113$ volts.

The fundamental component of the voltage across the line terminals is

by [30a] $E'_L=\sqrt{3}\times150/\sqrt{2}$
$=184.$

The third harmonic component of the voltage across the line terminals is zero.

The fifth harmonic component of the voltage across the line terminals is

by [30a] $E'''_L=\sqrt{3}\times40/\sqrt{2}$
$=49.$

The voltage across the line terminals is

by [44a] $E_L=\sqrt{184^2+49^2}$
$=191$ volts.

This line voltage is of course not equal to $\sqrt{3}$ times the phase voltage, as it is with a sine wave.

$\sqrt{3}\times113=196$ volts.

In the case of a balanced load such as here described the voltage across one phase of it equals the line voltage divided by $\sqrt{3}$ and is thus

$E_p=191/\sqrt{3}$
$=110$ volts.

Observe that this is less than the voltage across one phase of the generator.

Answer to Question b.

In a balanced three-phase system as is here described the voltage between the neutral of the generator and the neutral of the load is zero if the phase voltage of the generator contains no third harmonic. If, however, the phase voltage of the generator contains a third harmonic, a voltmeter connected between the neutral points will indicate the full value of this harmonic.

$E=50/\sqrt{2}$
$=35.4$ volts.

Answer to Question c.

The voltage across each phase of the load consists of a fundamental and a fifth harmonic.

At 60 cycles, $x_L=6.28\times60\times0.025$
$=9.43$ ohms.

At 300 cycles, $x_c=10^6/6.28\times300\times30$
$=47.1$ ohms.

At 60 cycles, $x_c=10^6/6.28\times60\times30$
$=88.4$ ohms.

At 300 cycles, $x_c=10^6/6.28\times300\times30$
$=17.7$ ohms.

At 60 cycles, $x=88.4-9.43$
$=79.0$ ohms.

The capacity predominates at this frequency.

At 300 cycles, $x=47.1-17.7$
$=29.4$ ohms.

The inductance predominates at this frequency.

By [5a] $Z'=\sqrt{20^2+79^2}$
$=81.5$ ohms.
$Z'''=\sqrt{20^2+29.4^2}$
$=35.6$ ohms.

By [3a] $I'=150/(\sqrt{2}\times81.5)$
$=1.30$
$I'''=40/(\sqrt{2}\times35.6)$
$=0.795$

By [5a] $Z'_L=\sqrt{20^2+9.43^2}$
$=22.1$
$Z'''_L=\sqrt{20^2+47.1^2}$
$=51.2.$

By [3a] $E'_L=1.30\times22.1$
$=28.7$
$E'''_L=0.795\times51.2$
$=40.7.$

By [44a] $E_L=\sqrt{28.7^2+40.7^2}$
$=49.8$ volts.

This is the voltage across each reactor.

By [3a] $E'_c=1.30\times88.4$
$=115$
$E'''_c=0.795\times17.7$
$=14.1.$

By [44a] $E_c=\sqrt{115^2+14.1^2}$
$=116$ volts.

This is the voltage across each condenser.

Answer to Question d.

The components of the line current have already been found in the preceding question.

$$I=\sqrt{1.30^2+0.795^2}$$
$=1.52$ amperes.

Answer to Question e.

The true power input to any three-phase system, whether balanced or unbalanced, can be measured with two wattmeters, provided there is no neutral conductor. The power absorbed by each phase of this load is

$$P_F=I^2R$$
$=1.52^2\times 20$
$=46.2.$

The total power is $3\times 46.2=139$ watts. This would be the sum of the wattmeter readings.

Part II. Answer to Question a.

When the neutral point of the load is connected to the neutral point of the generator, the current in each phase of the load will be determined by its constants and by the voltage of each phase of the generator. Any harmonic that may be in this voltage will produce the same harmonic in the phase current. Before the neutral connection is made, all of the harmonics except the third and its multiples are effective, and if the load is a balanced one none of these harmonics will be altered when the neutral connection is made. Thus with a balanced load the only result of connecting the neutral points will be to produce a third harmonic component, or some multiple of the third, in the phase current.

The solution of Part II may be obtained by adding to the solution of Part I the effect of the third harmonic component in the current.

At 180 cycles $x'''_L=6.28\times 180\times 0.025$
$=28.3$
$Z'''_L=\sqrt{20^2+28.3^2}$
$=34.7$ ohms.
$x'''_c=10^6/6.28\times 180\times 30$
$=29.5$
$x'''=29.5-28.3$
$=1.2.$

The effect of the capacity predominates slightly.

$$Z'''=\sqrt{20^2+1.2^2}$$
$=20.0$ ohms.

The third harmonic component of the phase current is

$$I'''=50/(\sqrt{2}\times 20.0)$$
$=1.77$ amperes.

In Part I the phase current was 1.52 amperes. The current in this case is

by [43a] $I=\sqrt{1.52^2+1.77^2}$
$=2.33$ amperes.

This is the line current.

Answer to Question b.

If there is no third harmonic component, or multiple of the third, in the phase voltage, it makes no difference whether or not the neutral connection is made, provided the load is a balanced one. In this case there would be no current in the neutral connection. Since the third harmonic components of the phase voltages are in time phase, the currents that they produce in the balanced phases will also be in time phase. The current in the neutral connection will be the sum of three equal currents which are in time phase and it is thus equal to three times the phase current. The neutral current in this case is

$I_n=3\times 1.77$
$=5.31$ amperes.

Answer to Question c.

The fundamental and fifth harmonic components of these voltages are not altered by making the neutral connection. The third harmonic component in the voltage across the reactor is

$E'''_L=1.77\times 34.7$
$=61.4.$

The voltage across the reactor is

by [44a] $E_L=\sqrt{49.8^2+61.4^2}$
$=139$ volts.

The third harmonic component in the voltage across the condenser is

$E'''_c=1.77\times 29.5$
$=52.2.$

The voltage across the condenser is

by [44a] $E_c=\sqrt{116^2+52.2^2}$
$=79.0$ volts.

Answer to Question d.

The only difference in the two cases is that there is now a third harmonic current in the current coil of the wattmeter. Since, however, there is no corresponding harmonic in the voltage across the potential coil—*i. e.*, the line voltage—the readings of the wattmeters will not be affected. A wattmeter will only give a steady deflection when the current and voltage are of the same frequency. The sum of the readings will be 139 watts.

Answer to Question e.

The resistance loss due to the fundamental and the fifth harmonic will not be changed. The loss due to the third harmonic per phase is

$P'''=1.77^2\times 20$
$=62.6$ watts.

The loss in the three phases is
$3\times 62.6=188$ watts.

The total power delivered is
$P=139+188$
$=327$ watts.

When a three-phase system has a neutral conductor, the power supplied will often not be correctly measured by the two-wattmeter method. In the present case the power loss due to the third harmonic is greater than that due to the fundamental and the fifth harmonic combined.

This is because the circuit is nearly in resonance for the third harmonic.

This concludes the series of electrical engineering problems, which was begun in the issue of September 5, 1914.

Chicago Vehicle Meeting.

At the meeting of the Chicago Section, Electric Vehicle Association of America, held on June 8, it was found necessary to change the announced program, and an explanation was given by Wilton Bentley, of the K-W Battery Company, of the system of renting storage batteries by that company.

Batteries are rented at a stated rate per month for passenger vehicles or electric trucks, the price being determined by the size of battery alone. This rental covers all battery expenses, except charging. As service is the largest question involved in the use of batteries, this should prove a very satisfactory scheme to battery users, as they are guaranteed a maintenance of battery capacity. This is also advantageous to the company, as the battery can be handled in the manner in which they consider best as regards renewals, etc. It was decided that rental upon a monthly basis was the only practical scheme, although it is recognized that time alone is not a measure of the real cost. The amount of monthly rental must, of course, be based upon average conditions of use. Contracts are nct made for a less period than one year. A plan is in effect whereby garage owners can co-operate in this method of providing users with battery service.

It was also announced at this meeting that the Baker Motor Vehicle Company and the Rauch & Lang Carriage Company, of Cleveland, O., had consolidated under the name Baker R. & L. Company. The officers of the new company are: C. L. F. Wieber, president; Fred R. White, first vice-president; Charles E. J. Lang, second vice-president; R. C. Norton, treasurer; George H. Kelly, secretary; F. W. Treadway, counsel.

New Officers of Illuminating Engineering Society.

At the recent election of the Illuminating Engineering Society, the following officers were elected for a term beginning October 1:

President, C. P. Steinmetz.

Vice-presidents, Clarence L. Law, J. L. Minick.

General secretary, Alten S. Miller.

Treasurer, L. B. Marks.

Directors, W. A. Durgin, M. Luckiesh and J. A. Norcross.

Officers of sections were elected in conformity with the ticket, as given in the issue of May 8, page 850.

The proposed constitutional amendments were adopted. These provide for an additional grade of membership, and make the annual dues in the future $10.00 for members, and $5.00 for associate members.

NATIONAL DISTRICT HEATING ASSOCIATION.

Seventh Annual Convention Held at Chicago, June 1 to 3.

The seventh annual convention of the National District Heating Association was held at the Hotel Sherman, Chicago, Ill., on June 1, 2 and 3. The total attendance was 259, made up of 99 active members, 101 associate members and 59 ladies.

The first session was called to order by President H. R. Wetherell at 10:30 a. m. on Tuesday. Harry Miller, prosecuting attorney for the city of Chicago, was introduced in place of Mayor Thompson to welcome the delegates to the convention. He made an appropriate address, which was responded to by Davis S. Boyden.

President Wetherell then delivered his annual address. He said that half of the district heating companies claimed that they were not making money. These are usually the companies who do not know how much steam they are sending out per square foot of radiation connected, what their line loss amounts to, what revenue they are receiving per square foot or per pound of condensation. Frequently there is no one person in direct charge of the heating department. He said the day has come when steam heating should not be looked upon as a by-product of electric operation, to be given away at cost or at a loss to secure the electric business. With modern heating systems and proper attention and engineering, steam can be sold by meter rate at a cost which is attractive to the customer and which pays a good revenue to the company. He considered the public service commission a good thing for the district heating company. In the case of 90 per cent of the companies which are losing money in their heating departments it is not due to excess cost of operation, but to too low charges. If the customers were put on a meter rate and taught how to regulate their service, their season's charge could be reduced from the flat rate and the company could make money at the same time. He advocated full publicity and attention to helping customers secure the most efficient service. The choice and the construction of the customer's heating system should also receive consideration.

The secretary, D. L. Gaskill, then submitted his report, which showed a balance in the treasury of $1,053. This is the most satisfactory condition of the finances since the birth of the Association. The total membership at present is 344, an increase of 15 per cent over last year. District heating is beginning to spread in Europe, and he recommended steps to increase the foreign membership of the Association.

The report of the auditing committee, which found the accounts correct, was then presented by D. S. Boyden.

Secretary Gaskill read a communication from Lieut. A. Beau Vuenne, who is serving in the French army. This communication was written from the field and expressed his regret at his inability to attend the convention. A motion was passed instructing the secretary to send him the compliments of the members, and wishes for his safe return.

Secretary Gaskill then presented the report of the Executive Committee. Upon recommendation of the Committee, 26 Class A members, 20 Class B members, 4 Class C members and 13 associate members were elected.

The president then appointed as a Nominating Committee E. L. Wilder, F. B. Orr and C. H. Spiehler.

The report of the Station Record Committee was then presented by A. P. Biggs, chairman. This consisted principally of a study of franchises and was accompanied by a table giving the details of the franchise provisions of 19 operating companies. All of the franchises collected have been mounted in the Association Book of Forms, which is kept in the secretary's office and is available for reference there or at the home of the person desiring it. An appendix to the report contained useful data on steam consumption in different types of buildings, the cost of trench work and paving, and references to authorities on franchise matters.

The discussion of this report was taken up at the afternoon session, and was participated in by Davis S. Boyden, George N. Martin, C. R. Bishop, D. L. Gaskill and C. A. Gillham. Mr. Martin suggested that a compilation with respect to rates would be equally useful to that on franchises. Mr. Bishop suggested that the committee formulate a model franchise. He had found that many franchises contained objectionable features. He knew of one company which was struggling along under a franchise which fixed a maximum flat rate. Mr. Gaskill also advocated a model form of franchise.

The afternoon session was opened by an address by John F. Gilchrist, vice-president of the Commonwealth Edison Company and also of the Illinois Maintenance Company, of Chicago. The last named company was organized as a result of the necessity experienced by the Edison Company to operate steam-heating plants in order to obtain contracts for supplying electric power to buildings which had previously operated a combined heating and power plant. Where steam contracts have been taken in connection with electric contracts, the privilege is reserved of operating the heating in connection with the heating for other buildings in the locality. As a result a business has grown up which consists of a large number of centers for steam heating which may supply one or more city blocks. Concentration of production in this way permits certain economies. There is sometimes a disadvantage, however, where heating is sold on a flat-rate basis, that consumers will require greater service than when operating their own plant. If the steam is sold on a meter basis there is greater identity of interests, and it is easier to build up a profitable steam business. Other advantages of concentrating steam production are the reduction of smoke, the reduction of fire hazards, a lessening of traffic congestion in the streets through handling fuel and ashes in large quantities in motor trucks, and a conservation of coal through more efficient firing. The distribution of heat, like the distribution of electrical energy, is a natural monopoly which should be operated as such in every community. It should, of course, be subject to regulation by the proper regulative body. The possibilities of the business are enormous when one considers what a small percentage of citizens in any large city are supplied with central-station heat.

The report of the Public Policy Committee was then presented by D. L. Gaskill. This was discussed by C. R. Bishop, E. L. Wilder and others.

Underground Construction.

At the session on Wednesday morning three additional members were elected, and the report of the Committee on Underground Construction was then presented by its chairman, H. A. Woodworth.

This report summarized the answers received from a number of operating companies regarding a list of subjects dealing with operation. The replies show that there is a wide variation in the methods used throughout the country, but these variations are not due to geographical location or climatic conditions. Standardization is evidently a great need. Suggestions for standard practice are given. In certain cases the committee has received additional information from special researches and from persons having access to reliable data. The report includes a paper by H. O. Garman, engineer of the Public Service Commission of Indiana, on "Evaluation of Heating Utilities in Indiana." The final section of the report is devoted to a description of underground insulation and conduits as they are placed upon the market by various engineering and manufacturing companies.

This report was discussed by A. C.

Rogers, Byron T. Gifford, R. C. March, Edwin L. Wilder, George W. Martin, R. D. DeWolf, J. C. Hobbs, H. G. D. Nutting and Davis S. Boyden. Mr. Rogers advocated mains of small capacity with high velocity, as this will reduce the line losses. He advocated, however, the reduction of friction in trunk lines as compared with service pipes. He also disagreed with the committee's statement that steel pipe would outlast wrought-iron pipe.

Mr. Gifford stated that the average company did not analyze its operation carefully enough to know whether or not it was making money. Mr. Nutting also emphasized this point.

Bleeder Turbines.

The next paper presented was by F. W. Laas, entitled "Operating Experiences with Bleeder-Type Turbines." This paper gave an account of his experiences with this type of turbine, beginning in the early days when they were first introduced. Some of the necessary requirements were emphasized and the operating advantages pointed out. Among these is the fact that in case of a sudden peak load or an accident in the boiler room all the available steam can be used temporarily through the turbine condensing. He had not found any difference in circulation depending upon whether the supply of steam was pulsating. As an illustration of the loss in capacity under maximum conditions a certain 3,500-kilowatt turbine bleeds sufficient steam at 16 pounds back pressure to supply 400,000 square feet of radiation, with 10-per-cent loss in the mains. At the same time, it develops a maximum of 3,000 kilowatts. Running condensing it will develop 4,500 kilowatts. To get the best possible returns from bleeder operation, especial consideration should be given to the selection of the proper size and range as determined by the electrical, heating and pressure conditions, and their control at different times. Generally speaking, the electrical load should overbalance the heating load.

This paper was discussed by George C. Daniels, C. A. Hoppin, R. D. DeWolf, H. G. D. Nutting, N. G. Reinicker, J. C. Hobbs, L. S. Shaw and Davis S. Boyden. Mr. DeWolf has had experience with bleeder turbines in Rochester, N. Y., and considers their use favorably. He did not consider it necessary that a bleeder turbine should deliver a constant pressure, as a reducing valve can be used between it and the heating line. Means must be installed to prevent one turbine from backfeeding into the other and causing it to run away. No trouble has been experienced in operating these turbines. Their capacity is 7,500 kilowatts, and bleeding cannot be done with a load of less than 2,000 kilowatts. The station is equipped for metering the steam and hence the monthly evaporation of the station is known. The total amount of coal used can be split into two parts, one part being the amount required to generate as much steam as is sent out to the heating line at the average rate of evaporation, and the difference between that and the total amount of coal burned is charged up against the generation of electric energy. Other boiler-room expenses are apportioned in the same ratio. Fixed charges against heating are based on the extra investment required to carry the heating load, consisting mainly of piping and auxiliaries. The existence of an electric-street-railway load permits bleeding during the morning steam peak. The bleeder turbine works out much more efficiently under these conditions than where no such load exists.

Mr. Shaw favored the use of a turbine with hot-water heating, and told of a case where the return water was brought into the condenser and had its temperature raised 15 degrees. The vacuum was not so high as during other seasons of the year, but was always better than 22 inches.

Educational Committee.

The session on Wednesday afternoon was opened with a report of the Educational Committee, which was presented by Davis S. Boyden, chairman.

The work of the committee was divided among the different members and covered the following subjects: establishment of a standard for transmission losses from buildings of all constructions; establishment of standard methods of proportioning direct radiation and standard sizes of steam and return mains; establishment of a standard coefficient for heat losses effected by wind movement; establishment of standard heating elements for cooking apparatus, with special reference to low-pressure steam. The second part of this report is devoted mainly to data required in estimating an installation for heating buildings by direct radiation. In addition many useful hints are included covering operating conditions. A study of the wind effect upon heating modifies the constant given last year.

This report was discussed by H. A. Austin, E. A. May, James A. Donnelly, R. D. DeWolf, H. G. D. Nutting, R. C. March, H. R. Wetherell, C. A. Hoppin, J. G. DeRemer, S. T. Mason, A. E. Bettis, H. A. Woodworth and Byron T. Gifford.

Mr. May told of independent investigations to determine radiation constants, and said that great variation in the coefficients had been found due to position of radiator in room, conditions of surface, surroundings, etc. Some of his figures checked with those of the committee, but others did not. He considered the question as to whether the use of variable coefficients was the right method of taking care of such variations. The difference in the effects of radiation and convection is an important problem.

A number of the speakers told of successful installations for the use of low-pressure steam for heating and cooking operations, and it was generally agreed that this method was entirely feasible where installations are properly made. In many cases better results are obtained with low-pressure steam than with high-pressure steam.

A motion was carried at this session directing the secretary to obtain a copyright upon the proceedings of the convention.

In the absence of the author, Secretary Gaskill then presented a paper by C. F. Oehlman entitled "Commercial End of the Heating Business." This paper described the practice of the Denver Gas and Electric Light Company. This company's rates for heating are a combination of a fixed charge and a consumption charge, the former being based on the cubical content of the building, exclusive of basement and courts. Full information regarding a building is recorded upon a "house card" as soon as an inquiry is received. As the transaction progresses additional data are added and the cards are permanently filed. Condensed records of the business with each customer are prepared at the end of the year, and an analysis made showing the average revenue received per thousand cubic feet heated and per thousand pounds of condensation. This record is very valuable in new-business work in answering complaints. Buildings are divided into 13 different classes and separate figures computed for each classification. Customers are instructed in the best method of operating a heating system and occasional inspections are made. At the time of connecting a customer a service installation charge of $3.00 per lineal foot is made, measured between basement wall and street main. A curb valve is installed by the company, but the house valve left for the heating contractor. All complaints are received by the Commercial Department and turned over to the Trouble Department, which makes an inspection and remedies the fault if possible; otherwise gives advice as to the best course. The company does not assume the responsibility for proper operation of a system. Constant efforts are made to bring about closer relations with heating contractors, and the latter are requested to submit plans prior to letting of contracts. Unusually high bills are usually traced to

wasteful methods. Meters are reread and tested when customers so desire. A night patrol system is in effect, which provides for turning steam off at the curb at night when desired by a customer whose tenants are found to waste steam. This service is furnished without charge and grows in popularity.

This paper was discussed by C. A. Gillham, C. R. Bishop, B. T. Gifford and H. R. Wetherell. Mr. Gillham favored extending responsibility beyond the inlet valve, as this tended to make satisfied customers and increase the ability to collect a fare rate. Mr. Bishop found it necessary to inspect customers' premises. Mr. Gifford told of a recent decision of the Railroad Commission of Wisconsin that the operating company is the one to decide the amount of radiation required in a building and the layout of the piping, as well as the sort of service line leading into the building. Mr. Wetherell stated that his company made out the specifications for interior piping of every building that is connected with the mains. The expense incurred is well worth while. Architect and steam fitter are protected by this method, and the inspection prevents the installation of work which is not according to specifications. It is thus impossible for a contractor to take a job at a cut price and skimp it.

Election of Officers.

The election of officers followed this discussion and resulted as follows:

President, Davis S. Boyden, Boston, Mass.

Vice-presidents, Byron T. Gifford, Grand Rapids, Mich.; George W. Martin, New York, N. Y.; William S. Monroe, Chicago, Ill.

Secretary-treasurer, D. L. Gaskill, Greenville, O.

Members of Executive Committee, Thomas Donahue, Lafayette, Ind.; C. F. Oehlman, Denver, Colo.

Hot-Water Heating.

On Thursday morning the session opened with the presentation of a paper entitled "The Hot-Water Heating System in the Grand Central Terminal," by W. G. Carlton, New York City. This paper described the heating system installed in the group of buildings which partly cover the underground trackage in the Grand Central Terminal in New York City. There are ten buildings in this group, varying from 6 to 28 stories in height, and aggregating a total contents of about 50,000,000 cubic feet. Heat is supplied through hot water circulated from the terminal service plant and supplied at three different pressures, depending on the height of the building. Electrically driven centrifugal circulating pumps are used. These can be adjusted in speed from 500 to 1,000 revolutions per minute. Venturi meters are used on the main supply lines and at the entrance to each building where service is given. Recording thermometers are installed, one on the supply and one on the return line for each building. The heat furnished each building is computed from the amount of water furnished and the difference in temperature between the supply and return lines. Heat is charged for on the basis of 1,000,000 British thermal units as the unit of charge. During the heating season about 250,000 such units are supplied.

This paper was discussed by George W. Martin, P. Junkersfeld, S. M. Bushnell, H. G. D. Nutting, R. D. DeWolf, A. C. Rogers, D. S. Boyden, J. C. Hobbs and Mr. Carlton. Among the points brought out in the discussion was that hot-water heating was selected in preference to steam on account of the mains running in an inclosed space occupied by the railroad tracks; consequently if a pipe should break this would involve much less trouble with hot water than with steam under either low or high pressure. The high-pressure hot-water system used for the highest sections of the buildings has caused no trouble from leaking joints. Although charging on a basis of thermal units involves considerable computation and would not be practical for small customers, this has not caused any difficulty in the Grand Central system because the computations were made by an attendant who had considerable time to spare. No trouble has been experienced with the Venturi meters. Mr. Carlton raised the question as to whether a higher rate should be charged for hot-water heating than steam heating, in view of the fact that much better regulation is possible with the former system. There was no agreement by the speakers on this question.

Secretary Gaskill at this point announced that he had received from R. D. DeWolf, of Rochester, a check payable to the association for $202.58, this being the balance left from the Entertainment Committee's fund for the Rochester convention last year. The committee was thanked for this gift. The amount was turned over to the Executive Committee.

The report of the Station Operating Committee was then presented in abstract by Byron T. Gifford, of the American Public Utilities Company, Grand Rapids, Mich., chairman. This report is a comprehensive one, containing a mass of data and curve sheets on the operation of central heating plants. Report was made of a test on a boiler plant in which the performance was greatly improved by more careful operation in accordance with the recommendations of the committee's 1914 report; also after putting into effect the suggestions for increase in capacity and efficiency recommended at that time. Valuable data were reported on station operating costs. The proper accounting of operating costs was emphasized and suggestions made for five detailed classifications that should be followed. Much of the report dealt with the discussions of various kinds of coal and valuable data were given on the types of coal best suited to various types of stokers. Suggestions were given on improving the firing of coal. A new type of flow meter was described, also a unique water-softening plant. An appendix gave the characteristics of several hundred kinds of coal used in power-plant service.

The discussion of the report was opened by Joseph Harrington, Chicago. He showed the importance of close attention to the boiler room in order to secure efficient operation of the plant and stated that doubtless some three-quarters of all the central stations and boiler rooms in the country could be improved very decidedly by proper attention to this part of their operation. Even though a plant may be apparently well designed and operated, a check must be kept (preferably by the use of recording instruments and accurately kept records) on the performance from day to day. These records must be studied and analyzed if efficient combustion is to be maintained. A simple form of daily report was presented as a convenient means for checking the operations. The time required for analyzing the records will be well spent in the increased efficiency attained thereby. In closing his remarks, Mr. Harrington referred to trials that have been going on for some time on the use of powdered coal as a fuel and he predicted that its use would be found to be so advantageous as to produce almost a revolution in boiler-plant practice.

George P. Higgins, Detroit, also referred to tests made with powdered coal and pointed out some of the difficulties that are met with this form of fuel, but which in all probability will be solved satisfactorily in the very near future. George W. Martin, New York City, referred to the test of the New York boiler plant mentioned in the report. J. G. DeRemer, North Tonawanda, N. Y., spoke of some very simple methods by which the efficiency of the boiler plants was increased. He commented on many of the data presented in the report and then referred to the importance of considering the commercial end of the heating business. He felt that extremely much attention has been given to the physical and operating features of heating systems, but

practically none to the matter of increasing the business by securing new customers. Very few heating companies employ solicitors to increase their heating load. This is in very decided contrast to the practice of central-station companies in the electric field.

At the afternoon session the discussion of the report was continued. F. F. Vater, Chicago, referred briefly to the subject of water softening and H. G. D. Nutting, Milwaukee, Wis., described a plant in which a water softener was installed to good advantage. However, he did not think it was practical to carry water softening to the point of zero hardness, because in order to eliminate the last few grains of solids the cost of the softening plant would become prohibitive. Mr. Vater replied that in some instances conditions would justify getting an extremely low degree of hardness, whereas in many cases this would not be warranted. The question is not so much the amount of hardness present, but as to what constitutes the hardness. If this is due to high sulphate content, which results in a cement-like scale in boilers, this becomes a very serious problem.

President-elect Boyden, referring to the use of powdered fuel, called attention to the agitation aiming to use crude oil in atomized form and suggested that the Station Operating Committee consider the subject in its next year's report. Mr. Gifford, on behalf of the committee, said that this point and other matters brought out by the discussion would be considered during the ensuing year.

Exhaust Versus Live Steam.

The last paper to be presented was one by C. C. Wilcox, entitled "A Pressure Survey Study Constituting a Report on Comparative Use of Exhaust and Live Steam for Heating." This investigation grew out of a series of experiments carried out by the Central Illinois Light Company. Experiments were made at Peoria and Pekin, Ill. At the Pekin station, which is connected to Peoria by a transmission line, just enough electric current is usually generated to furnish sufficient exhaust steam to meet the demands of the heating system. Comparative records were obtained with exhaust steam and live steam for heating, measurements being made of the quality of the steam, the rate of flow, the pressure at different points of the pipe, the amount of condensation, the amount of feed water, the amount of coal consumed, etc. Detailed results are given. The results indicate that the heat consumption for a heating system under similar weather conditions is practically the same for either live or exhaust steam; that the weight of steam sent to the heating system increases as the heat content of the steam diminishes; that the carrying of an electric load in addition to the heating load cannot be accomplished without an increase in fuel; that the main condensation with live steam is less than with exhaust steam; that the pressure drop between station and end of line is more with exhaust steam, which is attributed to the higher velocity necessary; that pulsations in pressure caused by the engine exhaust are not appreciable very far from the source.

This paper was discussed by H. A. Woodworth, C. A. Hoppin, R. D. DeWolf, George W. Martin, H. R. Wetherell, Charles R. Bishop, W. T. Bayn, J. D. DeRemer, L. T. Mason, Davis S. Boyden, Byron T. Gifford, H. G. D. Nutting, Henry Meyer and A. C. Rogers. It was brought out that there is a very prevalent opinion among operating men that exhaust steam is more efficient than live steam for heating purposes, and many cases were mentioned where the coal consumption was greater on Sundays, or at other times when power was not being generated, and it was necessary to use live steam for heating. In certain cases power-generating machinery has been installed for the sole purpose of obtaining exhaust steam, the energy developed being in some cases wasted in a water rheostat. In other cases it has been shown that more heat was wasted with high-pressure steam, that a by-pass for its use would not pass sufficient live steam to give satisfactory heating, or that some other operating condition was not the same when using the live steam as when using exhaust steam. It was generally agreed that more tests are desirable bearing upon this point.

Mr. Martin agreed fully with the results of the authors, and quoted from two other papers presented before the American Society of Heating and Ventilating Engineers, which indicated the same conclusions.

Comparative data obtained by Mr. DeRemer showed that the results in different cases were conflicting. In larger buildings the consumption of steam was usually appreciably greater when using live steam, while in small buildings it was less.

Some criticisms of the test data were offered, especially with regard to making a steam test on an eight-hour run, but Mr. Wilcox replied that the results did not depend merely upon the coal consumption, but were verified by the measured condensation, which was accurate for a shorter run. Mr. Nutting stated that at the state capitol in Madison, Wis., the feed-water curve does not show any difference when the lighting load is turned on as compared with the hours when there is only a heating load. This plant is operated by a high-class engineer, and the lighting load is quite heavy.

A discussion was then had as to the advisability of publishing a quarterly bulletin, and a motion was passed ordering the secretary to do so. Various resolutions were then adopted, including a vote of thanks to the exhibitors, who were invited to exhibit at future conventions.

The question of securing lower rates for fire insurance on buildings supplied by district heating companies was then brought up, and as such a recognition of lesser fire hazard would be an argument for using district heating, the Public Policy Committee was directed to inquire into the matter and report to the Executive Committee. Secretary Gaskill pointed out that the fixing of rates was entirely in the hands of the Chicago Rate-Fixing Bureau, and that it was useless to take the matter up with any of the local inspection bureaus.

The convention then adjourned.

Entertainment.

The entertainment features of the convention were as follows. On Tuesday afternoon there was a musicale and card party for the ladies, and in the evening a theater party for all. On Wednesday morning there was a shopping tour for the ladies, and in the afternoon an automobile tour. On Wednesday evening a banquet took place at the Hotel Sherman, followed by dancing and a special entertainment. On Thursday the ladies were taken on a shopping tour and upon a lake excursion to the United States Training Ship *Isle de Luzon,* where luncheon was served.

Exhibits.

Exhibits were prepared by the following companies and displayed in a room of the hotel immediately adjoining the meeting room: Central Station Steam Company, Republic Flow Meters Company, National Air Cell Covering Company, Cannelton Sewer Pipe Company, Illinois Engineering Company, E. B. Tyler, Michigan Pipe Company, A. Wyckoff & Son Company, H. W. Johns-Manville Company, Armstrong Cork Company, Boylston Steam Specialty Company, Westinghouse Electric & Manufacturing Company, Consolidated Engineering Company, Detroit Lubricator Company, the V. D. Anderson Company, American Radiator Company, American District Steam Company, G. M. Davis Regulator Company, J. C. Hornung and Jenkins Brothers.

The concrete power station operated by B. W. Page, at Jackman, Me., and furnishing electric lighting to that town, was damaged by fire on June 2.

Public Service Commissions

Conducted by William J. Norton

MAINE.

Filing of Schedules. The Commission has issued a general order classifying the service of all public utilities and common carriers under its jurisdiction. The rate schedules of each public utility are to conform to this classification. Electric service is classified as (1) lighting of residences, (2) lighting of buildings other than residences, (3) electric energy used in lighting plants or things other than buildings, (4) electric energy used for power, (5) electric energy used for heat, (6) all service where a minimum or meter charge, or both, is made, (7) all service where the customer's use of current is not continuous, or where the company's installation is for a short period of time, including summer (or seasonal) service.

NEW YORK—First District.

Legislative Investigation. Governor Whitman has dismissed the charges against the public service commissioners made in the report on the recent legislative investigation of the First District Commission. The Governor says: "In fact, so far as I am at present advised, and so far as this record discloses, notwithstanding what may have appeared at any time in the public press, the personal integrity of these commissioners has not been impugned," and concludes that he does not find in the record "proof of such inefficiency as is contemplated by the statute which gives the Governor the right of removal."

The only criticism of the Commission made in the Governor's statement, is the charge that informal complaints were not satisfactorily handled, and he says that the commissioners should have had a direct supervision of the handling by the subordinates of these informal complaints.

Chairman McCall has appointed Commissioners Williams and Hayward to look after the informal complaints, to note the progress made in satisfactorily disposing of them, and to decide if any are important enough to be taken up as formal proceedings. These commissioners are also at work reviewing the orders of the Commission to decide which of them should be rescinded and which of them have been neglected and ought to be fully enforced.

Second District.

New York Telephone Company. An opinion has been issued by the Commission approving of the cancellation by the telephone company of a number of obsolete contracts which are not in conformity with the recently adopted rates in New York City. The action of the company was delayed until the Commission could determine the number and character of the contracts affected. It was found that the proposed change would not result in a general increase in rates, but that it was a desirable and necessary move toward the elimination of unjust discriminations. About 1,700 subscribers now holding old contracts for low or flat-rate service, will be placed on the same basis with the more than half million other subscribers in the city of New York. The statement of the Commission is as follows: "In the cancellation of all discriminatory and preferential contracts the telephone company by its own action has relieved the Commission of the duty which the Legislature evidently contemplated should sooner or later be performed through the issuance of an order requiring precisely such action, if, after the lapse of a reasonable period—and it would seem from every point of view that the five years which have elapsed since enactment of the law must be considered such reasonable period—the corporation itself should not have acted upon its own initiative. The manifest spirit and intent of the law is that no discriminatory contracts or practices which afford one telephone subscriber or locality any advantage over other subscribers or localities similarly situated, shall be permitted; and the statute has been construed by the Commission as intending that within a reasonable time after its enactment all such discriminatory contracts and preferences shall be terminated and discontinued."

OHIO.

Union Gas and Electric Company. The Commission has handed down its valuation of the electric property of the Union Gas and Electric Company, of Cincinnati. The valuation is only tentative, and the company has 30 days within which to file objections to any estimates deemed to be unreasonable.

The reproduction cost new of the bare physical property as found by the Commission is very close to the figure in the company's valuation. The company claims $8,770,695, while the city, in the report prepared by Mr. King, allowed $6,881,452. The Commission's figure is $8,408,707.

The following table will afford a comparison of the allowances added to this basic figure in the three valuations:

	Company	Commission	City by Mr. King's Report
Reproduction new value	$8,770,695	$8,408,707	$6,881,452
Preliminary investigation	250,000	241,305	
Overhead	1,541,724	945,980	1,071,442
Working capital	226,852	110,108	241,673
Cost of developing business	2,716,765	312,000	
Cost of financing	2,550,263		
Value of franchise	5,581,600		
Less depreciation	$ 703,169	$1,566,520	$1,104,134
Total	$20,934,730	$8,451,580	$7,090,433
	114,951[1]	266,961[2]	82,527[1]
Grand Total	$21,049,681	$8,718,541	$7,172,960

1 Outside city. 2 Not used and useful.

Mr. King in his report gives $7,952,894 as the reproduction value of the electric property chargeable to Cincinnati, which amount includes his allowance for overhead costs. In his report he states that the overhead amounts to 15.57 per cent of the base cost. From these facts the figures in the city's valuation in the above table are computed.

Public Utility Provisions of New York Constitution.

Commissioners McCall and Van Santvoord, of the New York Public Service Commission, and Ex-commissioner Decker, recently appeared before the Public Utilities Committee of the Constitutional Convention of New York State in a hearing regarding proposals to make the public service commissions constitutional bodies. All three pleaded for constitutional safeguards against removal for political reasons. They agreed that the terms of commissioners should be extended to 10 years, and Mr. McCall urged an increase in salaries. Mr. Van Santvoord favored removal from the legislature of the power to regulate rates by enactment.

Electrical Construction

Electrically Driven Shingle Mill.

The only completely electrically driven shingle mill in the Northwest and perhaps in the world—a mill where belts and shafting are largely eliminated, is that of the C. B. Lumber & Shingle Company, of Everett, Wash. This company had signed the contract for a belt-driven shingle mill, but it was brought to the attention of its officials at the last moment that there was an advantage in an electrically driven mill, and a proposal for such an installation was secured from Gray and Barash, of Seattle, who afterwards did the work.

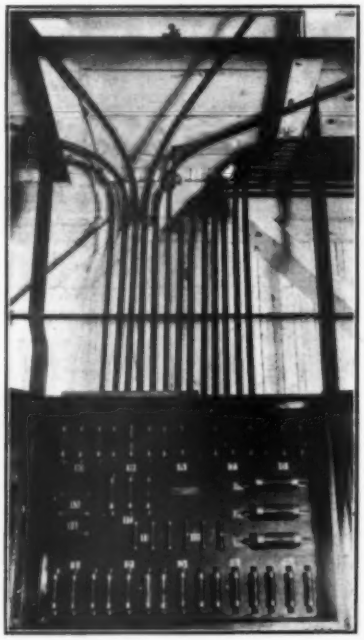


Fig. 1.—Distribution Panel.

As they had already purchased their engine it became necessary to increase the size of the main shaft and to have the main belt pulley redesigned into a flywheel, which was very cheerfully done by the builders of the engine, and a 350-kilowatt, 440-volt, three-phase alternator was designed for direct connection to this engine and the rotor of the same was pressed onto the shaft of the engine. (See Fig. 2.) After making these changes it was a comparatively easy matter to make the necessary alterations to do away with the belt-driven shingle machines.

Fig. 1 shows the method of installing power circuits, the same being run from the main distribution panel in conduit. There is a separate circuit for each machine, which is a very great convenience in locating any fuse trouble or making any changes or adding any additional motors from time to time, as the busses from the generator panel which connect up to the distribution panel are capable of handling the entire output of the generator.

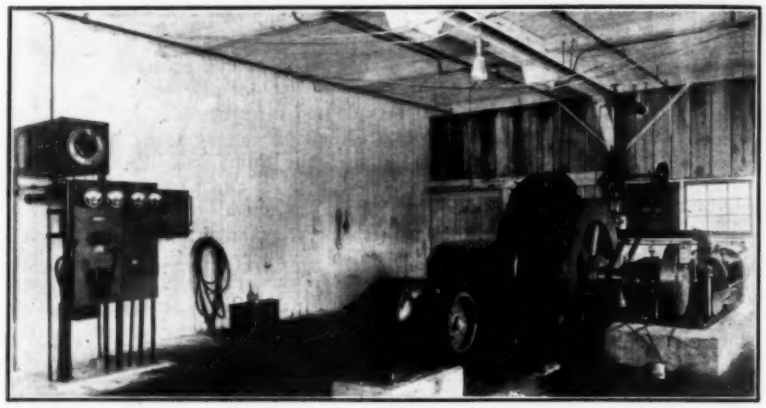


Fig. 2.—Generating Set.

The log haulup and the 84-inch cutoff saw are driven by a 50-horsepower induction motor. The power bolter, which is direct-connected to a 35-horsepower induction motor, is shown in Fig. 3.

This mill is also provided with a dust-collecting system which practically does away with all cedar dust, giving the men the benefit of pure air. This is also shown in Fig. 3, belted to a 20-horsepower induction motor, but this machine has since been arranged for direct connection.

Fig. 4 shows the front view of machines where the bolts are piled up by the conveyor men ready for the sawyer. Each shingle machine is furnished with a 20-horsepower, high-speed induction motor for the main saw and a 3-horsepower motor to drive the clipper saw, all motors being direct-connected, as shown in Fig. 5

All motors throughout the mill are provided with overload relay panels which instantly disconnect the motor

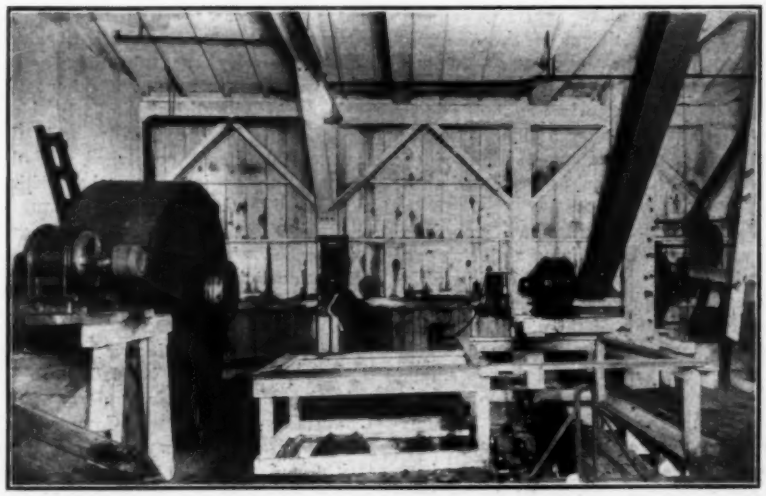


Fig. 3.—Motor-Driven Bolter and Cutoff Saw.

from the power circuit if they become overloaded or if the saw should be fouled in any way in the timber. This advantage is readily appreciated by the owners as it is a big saving on belts, saws, etc.

The capacity of this mill is 500,000 shingles in ten hours and it has been in operation several months and its success has been vouched for by the owners on several different occasions.

The cost of electrifying the mill was not to exceed 10 per cent more than the original plans, which called for a belt-driven mill. Gray and Barash, of Seattle, furnished and installed all of the electrical equipment, the complete installation being made by George Murray, their erecting engineer. It was necessary for the contractor to positively guarantee the results, which turned out beyond the expectations of the owners in every instance.

The steam engine and all shingle machines were furnished by the Sumner Iron Works, of Everett, Wash., and the motors and alternator were manufactured by the General Electric Company.

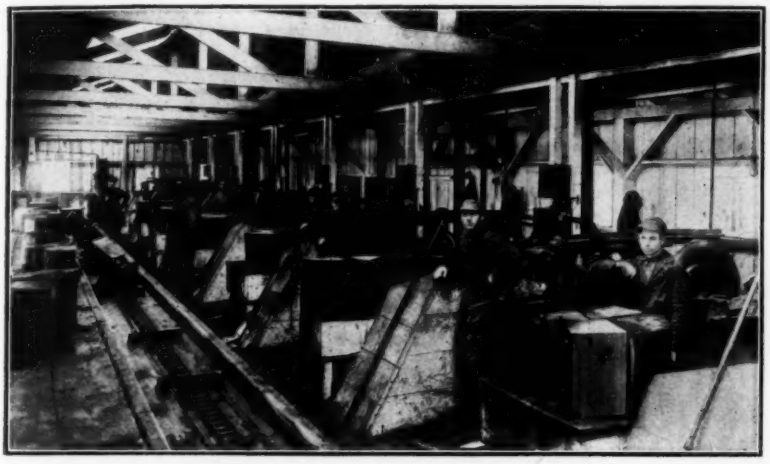


Fig. 4.—Conveyor and Shingle Machines.

Fig. 5.—Shingle Machines With Direct-Connected Motors.

Central Station and Contractor in Hartford Co-operate.

The Hartford Electric Light Company, Hartford, Conn., and the Griffing-Schofield Electric Company of that city are joining in a plan for house-wiring by which the house-owner is offered his wiring and fixtures at about cost.

For $50, which may be paid on the installment plan, all wiring and switches, fixtures, glassware, Mazda lamps and a five-pound electric flatiron are furnished. The schedule for the installation is as follows:

Front hall, 1 ceiling outlet, 1 chain pendant.

Parlor, 1 ceiling outlet, 1 three-light shower.

Two chambers, 2 bracket outlets, 2 one-light brackets.

Bathroom, 1 bracket outlet, 1 one-light bracket.

Cellar, 1 ceiling outlet, 1 key receptacle.

Kitchen, 1 ceiling outlet, 1 chain pull pendant.

Dining room, 1 ceiling outlet, 1 semi-direct bowl.

Kitchen special: 1 flatiron circuit, 1 receptacle with five-year guaranteed five-pound flatiron and six feet of cord.

New Officers of State Contractors' Associations.

Meetings of a number of state associations of electrical contractors have recently been held, at which the following sets of officers have been elected:

Arkansas.—President, W. A. Treadway, Little Rock; vice-president, John Bloom, Pine Bluff; secretary and treasurer, J. C. Dice, Little Rock; national director, James C. Rush, Hot Springs.

Connecticut.—President, L. L. Gaillard, Waterbury; secretary, G. M. Chapman, Waterbury; treasurer, Huntington Lee, New Haven; vice-presidents, N. B. Fitch, New Haven; E. S. Francis, Hartford; J. Warren Gay, New London; G. K. Spring, New Britain; H. R. Philbrich, Bridgeport. Executive Committee, E. M. Baldwin, Hartford, chairman; E. B. Wilcox, Meriden; C. F. Shepard, New Haven; J. S. Fisher, Danbury; E. S. Francis, Hartford. Sergeant-at-Arms, E. L. Stevens, New Haven. Director of National Association, George M. Chapman, Waterbury. Alternate, A. S. Green, Westport.

Kentucky.—President, Gus Albrecht, Louisville; vice-president, S. D. Dalby, Paducah; secretary, F. F. Valinoti, Louisville; treasurer, Charles Daubert, Louisville; national director, Frank E. Good, Louisville.

Texas.—President, A. J. Anderson, Fort Worth; vice-president, W. H. Earl, Dallas; secretary, Charles W. Graham, Dallas; treasurer, C. M. Cockrell, Dallas; state directors, J. L. Bergstrom, Waco; C. T. Sattleson, Fort Worth; E. T. Barden, Houston; H. L. Hancock, Dallas.

Co-operation at Glasgow.

In our issue of April 17 were detailed the terms of an agreement then nearing completion between the Corporation of Glasgow Electricity Department and Scottish electrical contractors. The terms have been finally approved with one slight modification. All fittings, accessories, lamps and apparatus sold from the corporation show room shall be at the usual retail selling prices.

Among the Contractors.

The Syracuse Electric Fixture Company is the name of a new concern which has been organized in Syracuse, N. Y., by Messrs. Way, Herman and Lanaute, formerly associated with the Miller Electric Company.

Hugo Herbert and Victor Coonrad have established the Michigan City Electric Company, and will carry a line of electrical supplies in the building of the Office Equipment Company, Michigan City, Ind. General contracting and repair work will also be carried on.

E. A. Braseth, electrical contractor, 815 Chestnut Street, Grand Forks, N. D., has secured the contract for the fixtures for the new Scandinavian-American Bank and Northwestern Trust Company Building at Grand Forks. The fixtures will be made by the M. J. Grady Fixture Company, Minneapolis, and will approximate 275 pieces.

The firm of C. J. & F. E. Briner, electrical contractors and engineers, 204-208 Franklin Avenue, St. Louis, Mo., is so optimistic about the future of the electrical business in St. Louis and vicinity that it is erecting a large three-story reinforced-concrete structure, and is expanding its business and taking on new departments. The new building is near completion at 1007 to 1015 Morgan Street. In the sales department it is expected to add a new line of electrical specialties.

Mayhew & Seymour have opened an electrical store and contracting business in the Danforth Block, Williamstown, Mass. They have bought the stock and business of Charles W. Fuller.

Russell & Company, New York City, are engaged in rewiring Georgian Court, the estate of George J. Gould, at Lakewood, N. J. This work comprises underground wiring and the interior wiring for light and power in the various buildings on the estate. Rigid conduit and flexible steel-armored conductor are being used. Another contract which has been secured by this company is to wire the Manhattan Club House at Twenty-sixth Street and Madison Avenue, New York City. This is an old building, which will be rewired and supplied with new fixtures, with a vacuum cleaner system with remote control, and with call bells and interior telephones.

The Charm Electric Company has opened a store at 141 Portland Street, Boston, Mass., with a full line of electrical supplies.

Building of Hatfield Electric Company.

Main Show Room on First Floor.

New Quarters of the Hatfield Electric Company.

The Hatfield Electric Company on May 1 opened to the public new show rooms and business building at their new location, Meridian and Maryland Streets, Indianapolis, Ind., and at that time accomplished a long cherished achievement of setting the pace for a bigger retail electrical merchandising establishment, which has been in the mind of the president of the company, T. B. Hatfield, for a number of years.

The new building is a four-story and basement structure, with a frontage on Meridian Street of 42 feet and a depth on Maryland Street of 114 feet. Being on a corner only one square from the exact center of the city, it affords exceptional advantages for electrical advertising, and makes it of easy access to the shoppers. The new home of the company is only a short way from the former location at 36 South Meridian Street, where offices and electrical shop were established for many years.

One of the big advantages of the company's new home and one which will tend to popularize its products, is the large show-window space, there being 54 feet of plate-glass show windows five feet deep, in which all kinds of electrical devices will be shown. In the size of the show windows, Mr. Hatfield has eclipsed any other electrical contracting and retail store in the country, it is believed, and has developed exceptional opportunities to popularize electrical devices.

The front portion of the first floor is devoted to the sale and display of all kinds of electrical merchandise, from a flatiron to a washing machine. The smaller devices are attractively displayed in glass floor and wall cases. The accompanying illustration gives but a meager idea of the attractiveness of this fine sales room.

The rear of the store is arranged for the service department with shelving along both sides and a large service counter where the wiremen, both purchasers and employees, may obtain materials for their respective needs.

At the extreme rear is the service entrance, through which all material is

received, without in any way disturbing the quiet of the front show rooms.

Entering the automatic elevator at the first floor, the customer is carried to the second floor, on which are located the general offices, drafting and engineering room, private offices and chandelier department. The offices are all communicating throughout, and are all commodious and well lighted.

The chandelier section is a novel departure from old-accepted ideas of fixture rooms, there being seven large beautifully arranged and decorated rooms, each room being a distinct or period type—French, English, colonial, craftsman, renaissance, Adam and commercial, and the walls, decorations, hangings and furniture are all truly representative of the period they represent. An idea of these rooms may be obtained from the accompanying illustrations of two of them.

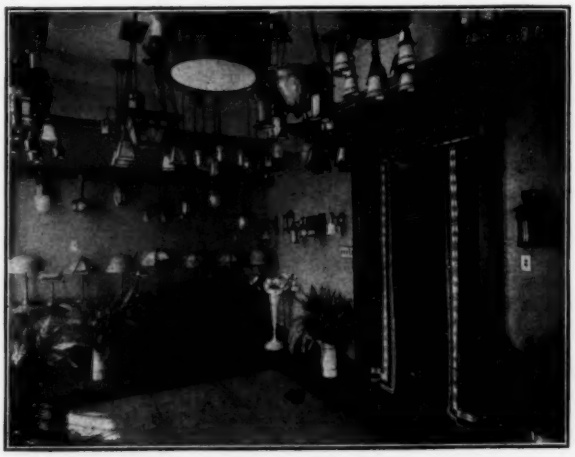
Another departure from the usual rule is in the two small rooms in which prospective customers may see any fixture or set of fixtures, properly hung and lighted, the same as if they had them in place in their own homes. This allows a true selection of fixtures for any prospective house owner.

The third floor has been set aside for a stock room for merchandise in original packages, and here also is kept the incandescent-lamp stock.

The fourth floor has a commodious shop and repair department, taking up the entire floor.

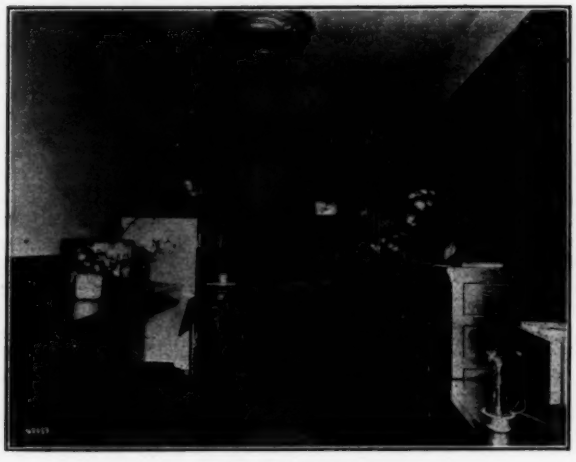
The basement contains the heavy stock of conduit, wire, knob-and-tube material, etc., and is served both by a service elevator in the rear and a sidewalk lift.

French Room.



Craftsman Room.

Office Corridor.



General Offices.

The Hatfield Electric Company has been in the electrical contracting and merchandising business for 27 years and has long been recognized as one of the leading responsible contractors of the country. The firm has done a great deal of the better class of work throughout the Middle West, among its recent jobs being the First National Soo Line Building, a 21-story office building at Minneapolis, Minn., and the Union Central Life Insurance Company's 35-story office building at Cincinnati, O. Thus the company's advent in the retail-merchandising field in a big way will surely help the "Everything Electrical" movement along for every one.

Both the electric lighting companies at Indianapolis have, during the past several years, recognized that the live contractor who has business abilities and a good store room to show his electrical merchandise, is a big asset to the lighting company and so they have fosterd a friendly feeling toward the contractor and have co-operated with him in every way possible to further the electrical merchandising industry. This is one of the things that has been the means of making the Hatfield Electric Company's large new retail store possible.

Examining Board Appointed in Chattanooga.

The appointments of the local Electrical Examining Board in Chattanooga, Tenn., have been made by Governor Rye as follows: Jesse Dugger, city electrician; Philip Sweet, contractor and Frank B. Quackenboss, of the Underwriters' Association.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 286.—Static in Press Room.—In the press room of a large printing establishment much trouble was experienced during the dryest part of last winter from static electricity causing paper sheets to stick. Attempts were made to take the static from the driving belts, but without entirely relieving the trouble. A suggestion was made that a humidifying apparatus be put in to keep the air more moist, it being claimed this would immediately stop the trouble. Is this a reliable solution? If not, what is the best way to get rid of the static?—C. A. C., Omaha, Neb.

No. 287.—Powdered Coal as Central-Station Fuel.—Recent experimental trials with powdered coal as steam-boiler fuel are said to have given almost ideal results from the standpoint of conbustion efficiency. Has this fuel been tried on any extensive scale under the boilers of any large or medium-sized central station? Is the method applicable advantageously to all kinds of coal? Is the cost of the crushing plant offset by the increase in efficiency?—B. A. M., Toledo, O.

No. 288.—Brush-Brass Finish.—Kindly explain, through the Questions and Answers Department, how the brush-brass finish now so popular on fixtures is applied. Why is it not so durable as polished brass? What conditions affect the durability and value of this finish?—G. C. N., Terre Haute, Ind.

No. 289.—Combination Electric Radiator.—I have just heard of a newly patented electric radiator which resembles a hot-water radiator and has an electric coil heat the water in the pipes; it is said to be more economical than a straight electric radiator. I fail to see this and would like to have it proven.—W. T., Cleveland, O.

No. 290.—Electric Fishing.—A friend of mine has told me it was possible to arrange electric wires in a fish net so as to greatly increase the quantity of fish caught. Is this prohibited by the fish and game laws?—P. S., Mobile, Ala.

Answers.

No. 281.—Maximum Demand of Residences.—In central-station systems using the two-rate system for residence customers it is customary to charge at the primary rate for the first 30 or 60 hours' use of the maximum demand. Since the cost of providing a maximum-demand indicator for each small customer is prohibitory, in view of the already heavy cost of watt-hour meters, what is the simplest and most equitable way of estimating the probable maximum demand?—E. C. R., Chicago, Ill.

The following methods are in general use in estimating the maximum demand of small customers:

(A) A percentage of the actual wattage connected based upon tables compiled by one of the larger electric light companies giving the averages for from 1 to 100 50-watt lamps connected for approximately 20,000 customers.

(B) An arbitrary percentage of the wattage connected, based in general upon the above-mentioned data. This method is used by the Wisconsin Railroad Commission, where in general 60 per cent of the active connected load for the first 500 watts and 33⅓ per cent for excess watts is considered as the maximum demand.

(C) The maximum demand may be based upon the number of active rooms, as, for instance, 2 kilowatt-hours per month for each active room is billed at the high rate and the excess use at the low rate.—W. J. N., Chicago, Ill.

No. 283.—"Jitney" Bus Regulation.—Have any of the public utilities commissions in the United States taken action to regulate the operation of "jitney" autos with the idea of protecting the safety of the public and the investments of security holders in regularly enfranchised street-railway companies?—T. M., Winnipeg, Man., Canada.

According to a pamphlet issued by the Fidelity Trust Company, of Baltimore, on May 10, 1915, entitled "The Evolution of the Jitney Bus," the following cities have regulated "jitneys" with the idea of protecting the safety of the public and the income of the street-railway companies:

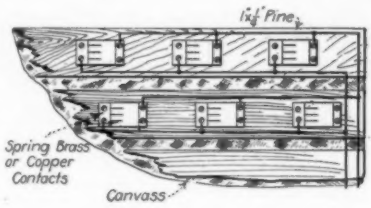
Aberdeen, Wash.; Atlanta, Ga.; Houston, Tex.; Little Rock, Ark.; Louisville, Ky.; New Orleans, La.; Norfolk, Va.; Oakland, Cal.; Ogden, Utah; Pueblo, Colo.; Seattle, Wash.; Tucson, Ariz.

"Jitneys" are regulated in the following states: Tennessee, California, Washington.

State regulation is being considered by: Illinois, Pennsylvania, Maryland, Massachusetts, New York.—W. J. N., Chicago, Ill.

No. 284.—Visual Indicator.—A physician, who has a public reception room always kept open adjoining his closed private office, wished to have arranged some kind of automatic electric indicator to show him when some one entered the reception room, this to be done preferably by a small lamp lighting up or some other visual means instead of a bell or buzzer that would disturb the patient in his private office. Is it possible to rig up something of this kind operated by stepping on the threshold of the reception room that would be passed by an electrical inspector?—W. C. N., Toledo, O.

This can be arranged most satisfactorily and at small cost as follows: First obtain at any electrical supply house what is called electric matting, using a piece of sufficient size so that those entering the door will be compelled to step on it; this acts the same as a push-button for ringing an electric bell, but in place of a bell or buzzer use a small ruby electric lamp, say about 6 candlepower, 6 volts with a battery of three or four dry cells. This number of cells is not sufficient to burn the lamp given to full candlepower, but the effect when used with ruby is much better; still, if not bright enough, the number of cells can be increased. The manner of wiring and connecting up



No. 284.—Fig. 1.

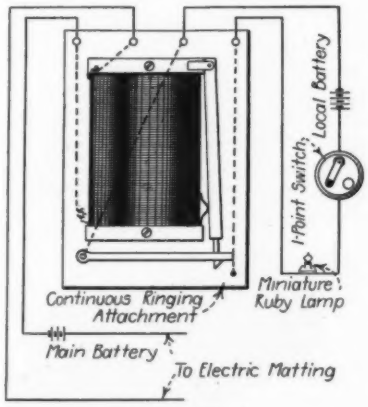
would be similar to an electric bell outfit. This can be very easily installed by any one having a fair knowledge of electrical work and is not subject to inspection by the electrical inspector. It could also be arranged to be used from an electric lighting circuit, but this would necessitate a different floor attachment at the door and also would then become subject to inspection for service. I would suggest the battery outfit, as the service is intermittent and the cost of operation and maintenance at 25 cents per cell very low, since the cells would last a long time. The electric matting at the door should be covered with a rug for appearance and protection.—F. F. H., Milwaukee, Wis.

There are several methods of operating visual indicators which may use current from batteries only, from the lighting cir-

No. 284.—Fig. 2.

cuit only, or the combination of the regular lighting current and batteries. The most satisfactory contact arrangement to be placed at the door is a strip of electric matting located beneath a rug. This matting is used largely for burglar-alarm service and can be procured from many supply houses dealing in electrical house goods. If the matting cannot be procured at the local dealer's store a suitable substitute can be made with little trouble. Figs. 1 and 2 show the details of a simple type of construction which consists essentially of one-fourth by one inch planed pine strips glued to a piece of heavy canvas with a half-inch space between them. Attached to the strips are numerous spring

brass or spring copper contacts, which are normally open as shown in Fig. 2. The contacts should be not less than three inches apart and staggered on alternate strips. The completed mat is placed under the rug at the door with contact side toward the floor. The stationary parts of the contacts are all connected to one wire and the movable parts to another wire, the two main wires being connected in turn to a length of two-wire flexible cord. Fig. 3 shows the arrangement using batteries for furnishing the current. The appliances include a miniature ruby lamp and socket, a one-point switch, continuous-ringing attachment and main and local batteries. The continuous-ringing attachment can be purchased from any electrical supply dealer and is made up in a variety of forms. When the matting is connected with the indicator and auxiliaries, as shown in the figure, a pressure on the matting from a person stepping on it will release the contact lever of the continuous ringer and the local circuit will be closed through the miniature lamp,



No. 284.—Fig. 3.

which will remain lighted until the ringer is manually restored to its normal position. The switch is opened when the indicator is not to be used and when the office is left unoccupied. The number of cells to be used in the local battery depends on the size and voltage of the lamp used.

An arrangement can be rigged up whereby the matting circuit can control a solenoid with plunger to work a standard pull-chain socket. This might not be so satisfactory a scheme, however. A better plan would be to use a bell-ringing transformer on the lighting circuit to the low-voltage side of which both the matting and local or lamp circuit would be connected in parallel; that is, the transformer would replace both the main and local batteries shown in Fig. 3. If this transformer were used to operate bells, buzzers, etc., in the house, then the switch should be placed where shown in Fig. 3; if the transformer is used for operating this visual indicator only, then a good snap switch should be put in its primary circuit.—N. G. M., Chicago, Ill.

There is no reason why this signal lamp could not be installed; and approved by an electrical inspector, provided the wiring was properly installed. The wiring to the lamp would have to be installed in accordance with the requirements of the Electrical Code for low-tension circuits. The lamp circuit would be controlled by a relay, placed in a convenient position, so that it could be reset in order to turn out the light; the relay would be actuated by a battery and controlled by contacts properly arranged and located on the threshold of the reception room. The relay circuit could be wired with ordinary bell wire; the relay would have to be of an approved type, and installed in a metal cabinet or case.—E. Q., Brooklyn, N. Y.

No. 285.—Motor Peculiarity.—A one-half-horsepower direct-current motor operating a small ceiling hoist was overhauled and cleaned recently and after starting up again we noticed that it started jerky and seemed to run faster with a large load than with a small load. On examining it again, the electrician swore he had both the fields and armature connected up as originally, but it still operates in this peculiar way. What is the cause of this? How can it be remedied?—S. P. A., Philadelphia, Pa.

From the statement that, after overhauling, the motor starts in a jerky fashion it can with great probability be assumed that a field connection has been broken. The rupture is perhaps not a complete one, the wires still giving some contact held together by their insulation. If the motor is shunt wound, this jerky starting would be more pronounced than for a series-wound motor. It is also possible that one of the field coils is temporarily short-circuited, the ends of the coil rubbing against each other thus causing an alternate weakening and strengthening of the field. This seems to be confirmed by the fact that the speed at full load seems to be higher than at no load. With one field coil short-circuited the neutral zone is different from what it was with full field and the reacting ampere-turns of the armature at full load weaken the main field so much that it is now weaker than at no load, thus resulting in a higher speed. Probably the commutation will also be much worse than before. The cleaning of a little motor is sometimes done too thoroughly and the fine wires are easily broken and disconnected. Armature, especially connections between collector and winding, field coils and all connections ought to be looked over carefully for any possible rupture. This can best be done by sending a current through the motor in a blocked state, if possible, or if not feasible, under full load and then read with a voltmeter the voltage drop across the different parts, especially across each individual field coil. If there are parallel circuits in the motor, the current in each path must be measured to ascertain whether the currents in the respective circuits are alike. Further, it is to be ascertained that the insulation is in good order and that no shorts exist between any of the motor circuits and the mass of the motor.—H. A., Pittsburgh, Pa.

In the inquiry no mention is made as to the type of motor used; it is assumed that it is compound-wound, as this is most suitable for the service. In this case the cause of the motor starting with a jerk and the speed increasing with load is due to the compound winding being reversed with reference to the shunt field. This will weaken the shunt winding to such an extent that the series winding will predominate and cause the motor to act with a high starting torque and is the reason for the motor starting with a jerk. The increase of speed with load is due to the increase of current in the armature and series field, which weakens the main field and this tends to increase the speed. By connecting the motor cumulative instead of differential, it should operate satisfactorily.—J. H. L., Lowell, Mass.

Electrics in England.

The Technical Subcommittee of the English Electric Vehicle Committee has completed, and will at once circulate, its report upon methods of charging and charging equipments. In connection with the further standardization of details appertaining to lead-plate batteries, the committee has asked the Accumulator Section of the Electrical Manufacturers' Association to consider the desirability of bringing about standardization in regard to (*a*) the clearance for the accumulation of sludge between the lower edge of the plates and the bottom of the cell container; (*b*) the size of the filler plug hole and a design of plug for same; (*c*) the distance between the top of the lip of the plug hole and the top edges of the plates, so that one gauge may always be used in a garage for fixing the proper level of the electrolyte, measuring from the top edge of the filler hole lip; (*d*) details of connectors between cells and method of connecting these to the plate terminals.

Arrangements are well in hand for the parade of electric vehicles on the Embankment, London, on June 17. On the same day a report will be submitted to the Municipal Electrical meeting there on the uses of the electric vehicle in municipal service.

Difficulties due to the war have come in the way of the immediate use of Edison electrically propelled dust carts in the Barnes borough area, recently referred to here. The government is keeping a tight hold upon all municipal borrowing and only allowing such as is essential in order to safeguard the public health or facilitate the more expeditions conduct of essential war operations.

New Electrical and Mechanical Appliances

The Hedlite Electric Iron.

An electric flatiron has just been developed with a feature that is entirely new in electric iron construction. This feature is a small Mazda lamp attached to the iron in front of the handle. On account of the position of this lamp the iron has been named the "Hedlite" iron.

The lamp is a standard four-candle-power, six-volt, round-bulb Mazda, which on account of its close proximity to the ironing board, gives more light on the board directly in front of the iron than would be obtained from several large lamps located in a ceiling fixture. The lamp is provided with a metal reflector, which is about as large in diameter as the handle against which it fits.

The reflector acts as a shield to keep the light from striking the eyes when the iron is in a vertical position. The lamp

Self-Illuminating Electric Iron.

socket is supported by the front handle bracket, and the supply wires for the lamp are carried through a metal tube to the interior of the iron. The lamp burns whenever the current flows through the iron, and thus also serves the purpose of a signal to show whether the current is "on" or "off."

The Hedlite iron is especially desirable where there is only one outlet, as is frequently the case in apartments and small dwellings. The current consumption of the lamp and iron is 500 watts. The iron is made in both tilting and non-tilting types. It is manufactured by the Pittsburgh Electric Specialties Company, Pittsburgh, Pa.

New Flush Receptacle.

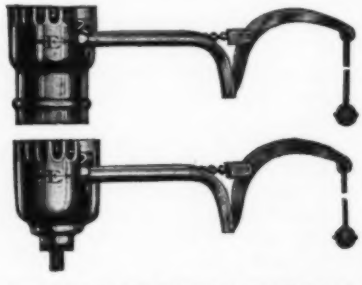
In line with its policy of developing new electrical fittings to meet new, anticipated or special requirements, the firm of Harvey Hubbell, Incorporated, Bridgeport, Conn., has placed on the market a new type of flush wall receptacle equipped with the new T-shaped slots.

Flush Receptacle With Cover Raised.

This type of slot receives interchangeably the 17 different kinds of Hubbell prong-type caps for attachment plugs, etc. The receptacle is of the lift-cover type and has a perfectly flush surface when not in use. A special hinge construction slightly projects the base of the cover when open, permitting it to fall back at an angle against the plate. This arrangement makes it impossible for the cover to drop down through unintentional jar and thus eliminates an annoyance commonly met with the lift-cover design. The face plate is finished in a variety of finishes.

Extension Attachments for Pull Sockets and Rosette Pull Switches.

The use of pull-chain sockets with

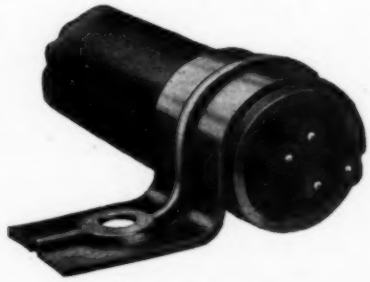


Extensions for Pull Socket and Rosette.

shades or reflectors of large diameter imposes a severe strain on the shade-holder because of the side pull of the chain or cord. This soon produces a dilapidated condition of the fixture unless the shade-holders are frequently readjusted. To overcome this difficulty, the Arrow Electric Company, Hartford, Conn., has added to its entire Arrow E line of pull sockets and rosette pull switches extension attachments which bring the cord out a considerable distance from the axis. As shown in the accompanying illustrations, the extensions are securely attached to the body of the device and are sturdily built for the service. The pull sockets are equipped with six feet of black cord; pull-switch rosettes are provided with 10 feet of black cord.

New Clip for Supporting Pipe, Conduit or Cable.

A new type of metal clip for supporting conduit, lead-covered cable, gas, water and air pipe, has been put on the market by the Minerallac Electric Company, 400 South Hoyne Avenue, Chicago, Ill. This clip has three distinguishing features: it is low in price, strong in construction, and very



"Jiffy" Clip for Conduit or Pipe.

quickly installed. In fact, the speed with which it may be put up has caused the manufacturers to give it the trade name "Jiffy" clip. The illustration shows that it needs but a single screw or bolt to secure it in place. A rib in the center of the clip gives it stiffness against bending, so that despite its relatively light weight it is strong enough to meet all requirements. The screw or bolt hole is in the center of a round raised boss, which serves the purpose of a lock washer to prevent the clip from being loosened. These clips are made for four different sizes of conduit and pipe, from three-eighths inch to one inch. It is believed that use of this clip will result in considerable saving in cost of installation and give a neat and durable job.

Cutter Automatic Cutout Pulleys.

For many years it has been considered good practice to provide automatic cutout pulleys for raising and lowering arc lamps for the purpose of trimming and making repairs. Today the value of a device of this kind is considered of even greater importance, since the dangers to linemen have been greatly increased by the general adoption of high-voltage circuits for street lighting. Central-station managers appreciate also the big saving in revenue by a reduction of lamp outages.

To meet the increased demand for a reliable and inexpensive cutout, the George Cutter Company, South Bend, Ind., has placed on the market an improved automatic cutout that allows the wires to be run taut to the lamps and gives absolute protection when the lamp is lowered for trimming. This cutout pulley embodies some features well known to users of Cutter pulleys,

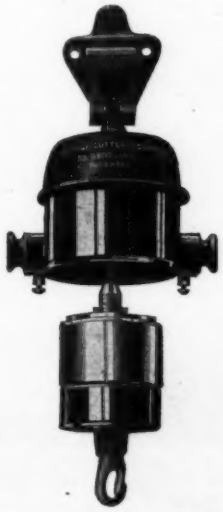


Fig. 1.—End View of Automatic Cutout Pulley With Supporting Knob Disconnected, as When Lamp Is Being Lowered.

introduced nearly a quarter of a century ago, but there are many new features that make this new pulley a decided advantage over the old.

An ingenious, simple and positive locking device sustains the lamp and holds it in contact independent of the hoisting rope. When a series lamp is lowered, the circuit is closed automatically, so that lamps can be trimmed, replaced or repaired with perfect safety. In this way lamp outages may be greatly reduced. When a multiple lamp is lowered, it is automatically disconnected from the circuit. Thus, in each case, the wires are never lowered; the trimmer pulls the rope until it comes to a dead stop, then releases it.

The locking ring automatically disengages with the locking sleeve, and the weight of the lamp or fixture forces the lower part of the cutout downward, as illustrated in Fig. 1. This part carries concentric contact rings connected to the terminals of the lamp. Upon raising the lamp these rings rub against the contact fingers concealed in the upper housing. This rubbing action insures clean contact surfaces, as the fingers themselves are directly connected in the circuit by means of binding posts. These are beneath the knobs, on opposite sides of the cutout pulley, which serve as a crossarm to spread the line wires.

All live parts are housed in and protected against climatic conditions. All

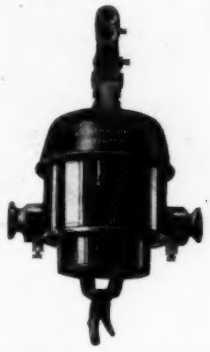


Fig. 2.—Cutout Pulley With Cable Clamp.

current-carrying parts are designed to withstand severe service, and the insulation is made to withstand extremely high voltages on either alternating-current or direct-current systems.

Various supporting parts are interchangeable. The cable-grip clamp for center span suspension, mast-arm

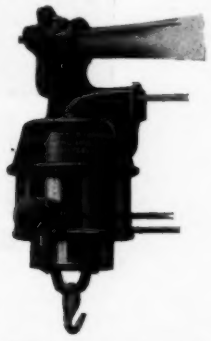


Fig. 3.—Cutout Pulley With Mast-Arm Clamp.

clamps, ceiling plates, etc., can be used with either multiple or series cutout pulleys. Figs. 2 and 3 show two views of the device with cable-clamp and mast-arm-clamp suspensions.

Of outdoor methods of installation, Fig. 4 shows a method of suspending lamps by means of old-style plain pulleys. The line wires sag and are lowered with the lamp. This endangers the life of the lineman while trimming. This old and unsafe method is being replaced rapidly by the use of Cutter cutout pulleys, as illustrated in Fig. 5. The following advantages for this improved method are pointed out by the manufacturer:

(1) No ladders to carry or climb; a trimmer's ladder is likely to fall or he may lose his hold on the pole.

(2) Lamps supported by these automatic cutout pulleys can be trimmed or cleaned by one man in less time, and without danger, than if supported by any other means.

(3) Grounds and bad lamps are easily located; expensive lamps are protected from burnouts.

(4) Outages can be quickly remedied and penalties thereby saved.

(5) Wires are run taut to the lamp.

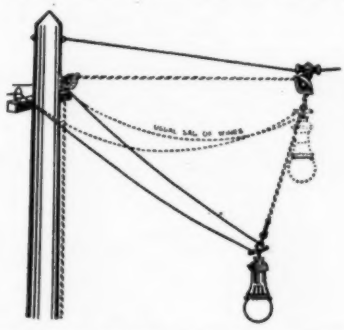


Fig. 4.—Old Method, Using Plain Pulleys.

Loose wires hanging over the street are easily broken by swaying in the wind, by sleet, falling trees, etc., and on falling to the street are a menace to traffic.

(6) Lamps supported by these cutout pulleys may be lowered between trolley wires and other obstructions.

In the case of interior installations,

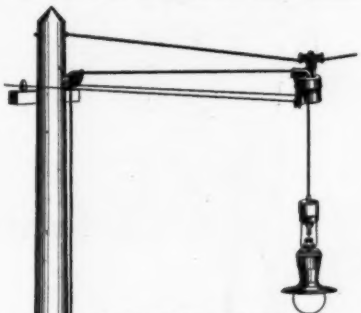


Fig. 5.—New Method, Using Cutout Pulley.

high-hung electroliers, indirect lighting units and fixtures for gas-filled tungsten lamps should be lowered frequently for the purpose of cleaning lamp bulbs, glassware and reflectors. This is essential to secure maximum efficiency in illumination. The Cutter automatic cutout pulley fills a long-felt need for a substantial and reliable automatic cutout for interior uses, such as in churches, armories, gymnasiums, etc. It is approved by the National Board of Fire Underwriters.

Westinghouse Electric Ranges.

"Ready by the clock" is the slogan adopted by the Westinghouse Electric & Manufacturing Company for its new line of electric ranges, signifying that meals can be cooked on these ranges to be ready at a certain time.

The ovens of these ranges, on certain types at least, have automatic temperature and time control. The thermometers in the oven doors can be set for the desired temperature and the clock switch set for the time it is desired to begin cooking. At the time set the circuit is closed and the ovens begin to heat. As each oven reaches the desired temperature, the current is automatically turned off and the range continues to cook on the fireless-cooker principle.

These ranges are full family size and are for domestic use. They are of metal construction throughout and are very convenient to operate.

The heat-storage principle used in the ovens makes them unusually economical in the consumption of current and also fixes the middle of the peak load caused by the ranges from an hour to an hour and a half earlier than it would be if the current were used continuously.

By means of the automatic control, which is claimed as an exclusive feature, it is possible for the housewife to leave the range to itself after the food is prepared, and go calling or shopping with the assurance that the meal will be properly cooked and hot at the desired time and with a minimum consumption of current. This arrangement also makes it possible to prepare breakfast before retiring at night and have hot, deliciously prepared cereals and coffee ready at breakfast time.

The range can also be operated similarly to an ordinary gas range. For broiling steaks, chops, and similar operations, the heater in the large oven is placed inverted at the top of the oven where there is a receptacle into which it can be plunged. The broiler pan rests on racks directly under the heater.

Small-Size Automatic Range.

The ovens are an improvement over the ordinary fireless cooker in that they have a better designed internal ventilating system which carries off surplus moisture and deposits it in vessels underneath the range, but does not allow the heat to escape. The oven walls are lined with two inches of rock wool, which in conjunction with tight-fitting doors with compression latches effectually prevent the escape of heat. Meats, bread, cakes and pies can be evenly browned to any degree.

There are three stove-top heaters, two of them eight inches in diameter and one ten inches. The eight-inch heaters have the usual series-multiple connections for three heats while the ten-inch heater can be heated in sections, either six inches, eight inches, or ten inches in diameter. This control is effected by snap switches on the front of the range. The stove-top heaters are not equipped with automatic control, but a turn of the switch brings the plates to a red heat almost instantly.

All heaters used in these ranges are of the radiant type with replaceable heating elements. The heating elements are inexpensive and can be replaced in a few minutes with a screwdriver and pliers. In the stove-top heaters, the heating elements are laid in deep grooves in a molded porcelain compound that does not chip or crack under extreme heat and is impervious to water, acids and alkalies. These heater beds have been found to be practically indestructible.

An important feature of these ranges is that all parts are easily accessible for thorough cleaning. Everything can be removed from the ovens, including the guides for the trays. As the ovens are lined with rust-resisting Toncan metal, they can be thoroughly scoured, with no ill effects whatever. The bottom of the oven is above the door sill which makes it easy to clean.

By removing two small screws, the stove top can be lifted up and back, disclosing every contact to the heaters and switches. Sliding panels at the back of the range can also be easily removed and disclose all the

Westinghouse Automatic Electric Range, Large Size.

View Showing Accessibility of Heating Units in Large Range.

wiring and connections to the automatic circuit-breakers.

The ranges are made in two sizes and either with plain or nickel-finish trim. Each size is made in both the automatic and non-automatic types.

The total wattage for the large-size range is 5,850, divided as follows:

Large oven	1,500 watts
Small oven	850 watts
Ten-inch heater	1,500 watts
Each eight-inch heater	1,000 watts

As the small-size range has no small oven, its total connected load is 5,000 watts. Of this total load, however, more than 3,500 watts is seldom used at any one time, and this only for a very short time, as it requires only 32 minutes to bring the large oven to baking heat, and considerably less time to secure boiling heat.

A record obtained from 24 families over a period of six months shows an average consumption of about 100 kilowatt-hours per month. Considering the saving made possible in servant hire and in the more economical use of food with these ranges, they make a very attractive proposition to the householder. From the standpoint of the central station they produce an increase in load at an hour that is generally earlier than the evening lighting peak.

Bristol Recording-Instrument Exhibit at San Francisco.

The Bristol Company, Waterbury. Conn., has a large exhibit of its extensive lines of recording instruments for pressure, vacuum, liquid level, differential pressure, temperature, voltage, current, electric power, time, motion, speed, humidity, etc., at the Panama-Pacific International Exposition, San Francisco, Cal. This exhibit is located in the Palace of Machinery and occupies a floor space 40 feet long and 30 feet wide. The exhibit booth is shown in Fig. 1. The decorations on the superstructure of the booth are actual models of Bristol recording instruments.

On the lower part of the outside columns of the booth actual working models of Bristol instruments are exhibited in operation, producing records of atmospheric temperature, the level of the tide in the bay several hundred feet away (recorded electrically), also records of conditions on the electrical circuits of the Palace of Machinery, including volts and frequency, record of the water pressure in the mains of the Palace of Machinery, and records of the operation of a series of signal switches provided for the visitor to manipulate at will.

Inside the booth, an interior view of which is shown in Fig. 2, more than 100 complete working models of the Bristol recording instruments are mounted on walls and tables, and of these instruments quite a number are arranged in the form of demonstration outfits which can be operated by hand by the visitor.

For instance, a hand-operated generator is provided for lighting a series of lamps and mounted with it is a Bristol recording voltmeter, an ammeter and a wattmeter recording simultaneously the voltage, amperage and wattage on these lamp circuits.

Another interesting demonstration outfit is a pair of the new Bristol patent long-distance electric thermometers, by means of which the visitor is shown how the temperature of his own hand could be indicated automatically on an instrument 50 miles away from the point at which the temperature is measured.

The instruments in many demonstration outfits are shown with glass fronts or without covers, making it possible for the visitor to see the simple internal construction, and to study the principles of operation. This makes the exhibit one of great educational value. Other Bristol products, such as Bristol patent steel belt-fasteners and Bristol patent set-crews, are also shown.

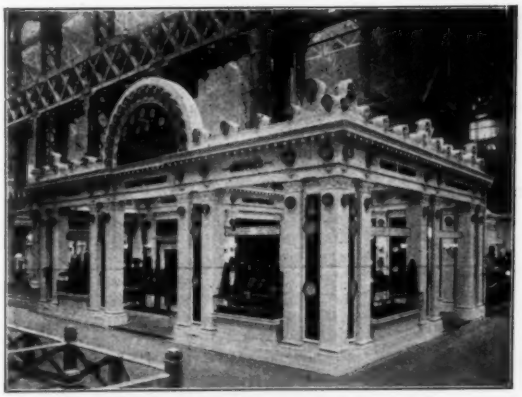


Fig. 1.—Exterior of Bristol San Francisco Exhibit Booth.

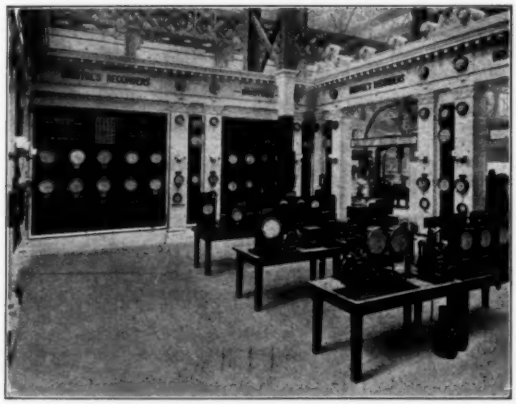


Fig. 2.—Section of the Interior of Booth.

Prest-O-Lite Storage Battery.

The entrance of the Prest-O-Lite Company, Incorporated, of Indianapolis, Ind., into the field of electric lighting for automobiles has just been announced. The company is now manufacturing the Prest-O-Lite storage battery. Of no less interest is the fact that the Prest-O-Lite Company, with its famous system of service, including 35 factory branches and more than 20,000 agencies throughout the country, aims to place behind the Prest-O-Lite battery a system of service stations of unusual character and scope.

The company states that its new interests will in no way interfere with the extension of its business in the well known Prest-O-Lite acetylene system. There is a popular impression that the widespread use of electric illumination on automobiles has adversely affected the gas-lighting industry; the Prest-O-Lite Company states, however, that the use of gas lighting in automobile practice is today larger than ever before.

Instead of pursuing the controversy between the electric and gas factions in the automobile lighting field, with which most motorists are familiar, the Prest-O-Lite Company has placed itself in position where it can not only furnish either kind of illumination, but can also furnish the extensive Prest-O-Lite service for either kind.

The Prest-O-Lite storage battery is designed as a distinctive type in the battery field. While embodying nothing that is revolutionary, the design will include features upon which strong claims of increased current capacity, in connection with decreased weight, will be based.

As a part of its activity in its new field, the company on June 1 purchased and absorbed the entire business, assets and patents of the Pumpelly Battery Company, of Indianapolis, and has incorporated in the new Prest-O-Lite battery many features of the more recent Pumpelly types.

Harry Murphy, president of the Pumpelly Battery Company, becomes a vice-president of the Prest-O-Lite Company, in addition to the company's present vice-president and treasurer, James A. Allison. Mr. Murphy will have active charge of the Prest-O-Lite battery department. The Pumpelly personnel has been absorbed into the Prest-O-Lite organization.

Mr. Murphy has been identified with the storage-battery industry since 1907, when he purchased the Western Storage Battery Company and organized the Pumpelly Battery Company, under which name the business was conducted until Mr. Pumpelly's recent death. James Kent Pumpelly, in the course of a long and active life in this industry, obtained a very long list of storage-battery patents, and is said to have built the first storage battery for commercial use.

Temporarily, the Prest-O-Lite storage battery will be manufactured in the old plant of the Pumpelly Company. The present factories of the Prest-O-Lite Company are quite fully engaged with the company's acetylene business, which has extended into many fields outside of the automobile industry, such as oxy-acetylene welding, house lighting, and many other new commercial applications of acetylene. New buildings will be erected shortly at the Speedway plant of the Prest-O-Lite Company, in Indianapolis, in which the new Prest-O-Lite storage battery will be manufactured on a large scale. The company's battery line will include ignition, lighting and starting batteries of several types and sizes.

Latest Approved Fittings

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

ASBESTOS MATERIAL.—Keasbey & Mattison Company, Ambler, Pa.

Asbestos building lumber used for wooden cabinets and for protection of surfaces exposed to high temperatures.

Listed April 29, 1915.

ATTACHMENT PLUG, Fuseless.—The Chelten Electric Company, 314 Armat Street, Philadelphia, Pa.

Separable attachment plug having composition cap. 660 watts, 250 volts, catalog No. 2000.

Listed May 3, 1915.

FUSES, Cartridge Inclosed.—General Electric Company, Schenectady, N. Y.

G. E. catalog No. 111382, 1.25 amperes, 600 volts, for use in special cutout bases; catalog Nos. 104846 and 104847 for protection of instruments on switchboards.

Listed May 4, 1915.

HEATERS, Electric. — Rutenber Electric Company, Logansport, Ind.

Reco toaster, 110 volts, 500 watts, Model 60.

Listed May 14, 1915.

INCLOSED SWITCHES. — Berry, Skinner & Company, 78 Upper Thames Street, London, England.

Two-pole, double-break, spring-actuated, plunger-type switches and cutout bases for standard cartridge inclosed fuses. Inclosed in metal cases and designed for manual operation without opening cases.

Masta, 15-200 amperes, 250 volts, catalog Nos. 8000½, 8002, 8003, 8005, 8100½, 8102, 8103, 8105.

Listed May 7, 1915.

INCLOSED SWITCHES.—Detroit Fuse & Manufacturing Company, 1400 Rivard Street, Detroit, Mich.

Two or three-pole, double-break, spring-actuated, plunger-type switches and cutout bases for standard cartridge inclosed fuses. Inclosed in metal cases and designed for manual operation without opening cases. When cases are open, fuse terminals are "dead," eliminating possibility of shock to operator.

Detroit iron-clad, 0-200 amperes, 250 volts, catalog Nos. 6251, 6361.

Listed May 10, 1915.

INCLOSED SWITCH. — General Electric Company, Schenectady, N. Y.

Quick-make-and-break induction-motor starting switch, equipped with time-element plugs designed to afford protection to motor against overloads maintained for longer than predetermined periods. Inclosed in metal case and designed for manual operation without opening case.

Type SY, 30 amperes, 125-250 volts.

Listed May 7, 1915.

INCLOSED SWITCHES.—Metropolitan Engineering Company, 1238 Atlantic Avenue, Brooklyn, N. Y.

Two or three-pole service switches with cutout bases for standard fuses and with meter-testing block inclosed in metal cases.

M. E. Company 61-100 amperes, 250 volts, catalog Nos. 147-48 with Colonial type fuses. These devices are not considered suitable for use in connection with secondaries not properly grounded, since they are not so designed that they can be promptly opened by a single operation.

Listed May 10, 1915.

MISCELLANEOUS. — Asbesto-Gleam Manufacturing Company, 846 South Canal Street, Chicago, Ill.

Asbestos lamp shades, with or without attached shade holder.

Listed April 28, 1915.

RECEPTACLES, Standard.—Union Electric Company, Trenton, N. J.

Porcelain shell, 660 watts, 250 volts.

Cleat type, catalog Nos. 757, 758.

Sign or conduit-box type, catalog No. 965.

Listed May 19, 1915.

RECEPTACLES, For Attachment Plugs.—General Electric Company, Schenectady, N. Y.

Flush receptacles. 10 amperes, 250 volts; catalog No. 49490. 20 amperes, 250 volts; catalog No. GE219.

Listed May 18, 1915.

ROSETTES, Fuseless.—Union Electric Company, Trenton, N. J.

Three amperes, 250 volts, catalog Nos. 762, 763, 765, 766 and 767.

Listed May 3, 1915.

SOCKETS, Standard.—Benjamin Electric Manufacturing Company, 120 South Sangamon Street, Chicago, Ill.

"Benjamin" brass shell.

Pull, 660 watts, 250 volts, catalog Nos. 435-437, inclusive.

Listed April 20, 1915.

SWITCHES, Knife.—H. W. Clay & Company, 3503 North Tenth Street, Philadelphia, Pa.

Knife switches with or without fuse extensions; 30 amperes, 250 volts, two, three and four-pole.

Listed May 18, 1915.

SWITCHES, Pendent Snap. — The Bryant Electric Company, Bridgeport, Conn.

Bryant or Perkins.

Three amperes, 125 volts, one ampere, 250 volts; key, through type, catalog No. WT99.

Listed May 4, 1915.

TRANSFORMERS.—Dongan Electric Manufacturing Company, 741 Franklin Street, Detroit, Mich.

Bell-ringing transformers, "Junior," 110 volts to six volts.

Listed May 14, 1915.

WIRE CONNECTORS. — General Electric Company, Schenectady, N. Y.

Cup terminal lugs. Each consists of a sheet-metal washer having an upturned rim and an extension with tabs to fold around wire.

These lugs are judged to be suitable for use in connecting wires of No. 14 to No. 8 B. and S. gauge to terminals on switchboards, rheostats, etc.

Listed May 19, 1915.

Current Electrical News

ATLANTIC STATES.

WORCESTER, MASS.—The City Council has voted to increase and improve the equipment of the power plant at the City Hospital and has appropriated $8,000 for the purpose.

NORWICH, CONN.—Stockholders of the Norwich, Colchester & Hartford Traction Company plan to construct an extension of this line, 25 miles in length, within the next two years. The road is already built from Silver Lake to Glastonbury, 7 miles. The directors of the road are: W. S. Garde, Hartford; Elmer Robinson, W. A. Strickland, Glastonbury; S. R. Ketcham, New York; C. E. Stark, T. C. Murphy, Frank Kromer, C. S. Holbrook, Norwich.

STAFFORD SPRINGS, CONN. — Improvements in street lighting are proposed, including the removal of old-type arc lamps and the substitution of 100-watt incandescent units. W.

TOCCOA, GA.—At a recent municipal bond election a vote for a $35,000 bond issue for erecting a municipal electric lighting plant was carried.

NORTH CENTRAL STATES.

CANTON, O. — A considerable amount of new construction by the Canton Electric Company and the Northern Ohio Traction Company is awaiting the enactment of an ordinance for the purpose of enabling them to place their wires in a part of the business section underground. As soon as this ordinance, which has already been introduced, is passed, the two companies will proceed with the contemplated work. L.

DAYTON, O.—The Dayton Power and Light Company is making an effort to secure a contract from the city of Xenia for the installation of an ornamental street lighting system. The Business Men's Association, at a recent meeting, indorsed the plan, and it will probably be approved by the city council. L.

DAYTON, O.—A movement is on foot to extend the boulevard lighting system on Third and Fifth Streets for more than a mile westward from the center of the city. The project is supported by the West Dayton Civic League.

FULLERTON, O.—John Davis, who recently purchased the plant of the Fullerton Canning Company at auction, is planning to install additional power units and a generator set to furnish current to the town for all purposes. L.

SMITHVILLE, O.—Articles of incorporation have been filed by the Smithville Light and Power Company. Capital, $3,000. Incorporators: C. V. Hard, C. L. Allis, D. J. Hard, J. B. Taylor and Barrett Landow. The company has a ten-year contract for street lighting. Current will be supplied by the Wooster Electric Light and Power Company, which will build an eight-mile transmission line for the purpose.

SPRINGFIELD, O.—The city is to be equipped with a complete system of electric street lights. Address president of city commission.

VAN WERT, O.—The Northwestern Ohio Light Company, which has been organized by Lindsey Hooper, C. A. Radcliffe and other local citizens, will construct an electric plant. The company is capitalized at $10,000. L.

YOUNGSTOWN, O.—The installation of a park lighting system which will take in all of the public recreation centers of the city, with ornamental posts and cluster lights, is being planned by the city authorities, with H. Whitford Jones, city lighting expert, in charge. L.

GREENVILLE, ILL.—The Henderson Light and Power Company is in the market for 400-kilowatt, alternating-current, 60-cycle, revolving-field generator, exciter, switchboard, etc.

MATTOON, ILL.—The city council is considering the combination of the municipal water and electric plants. Plans and specifications are being drawn by Superintendent James. Z.

MORRISON, ILL. — The money needed for the new boulevard lights for this city is now practically assured, and in a few days the city will be able to enter into a contract for the new electric lighting system. Address mayor.

ST. PAUL, MINN.—Bids on the electrical work of the First Baptist Church, Northwood, Iowa, will be received by Alban & Lockhart, Endicott Building, this city, or by E. H. Dwelle, treasurer of the church, Northwood, Iowa, until June 16. Check for $50 must accompany bid on electrical work.

SPRINGFIELD, MINN.—The village recorder will receive bids on the installation of a 100-kilowatt alternating-current generating set, including engine, generator, exciter, series regulator and switchboard complete, until 8 p. m., June 14. Separate bids are also requested on transformer and meter contracts, on which transformers and meters may be bought at any time and in any quantity. Certified check for $300 must accompany each bid.

KIRKSVILLE, MO.—The city will vote June 24 on a $70,000 bond issue to build and equip an electric light plant and to complete rebuilding water works. Address mayor.

LIBERTY, MO.—The city is planning to construct an electric light plant to cost $55,000. Address mayor.

ANAMOOSE, N. D.—The city council at a recent meeting awarded a franchise to Walper and Woodruff for the installation of an electric light and power plant.

MICHIGAN, N. D.—A municipal electric light and power plant is to be installed here at once.

SOUTH CENTRAL STATES.

BERRY, KY. — A street electric light system is to be installed here. Address the mayor.

ELIZABETHTOWN, KY.—J. P. Todd, manager of the Kentucky Utilities Company, at Elizabethtown, has purchased the Horse Cave Electric plant and incorporated the Horse Cave Light & Power Company, with $10,000 capital, articles of incorporation having just been filed. Mr. Todd, Mrs. J. P. Todd and J. A. Todd are the incorporators. G.

HARLAN, KY.—The John A. Stewart Electric Company, headquarters in the Penobscot Building, Detroit, Mich., is back of the project, which has been reported, to construct a $250,000 power plant here to supply power and lights for the mining operations of this section. Mr. Stewart himself was recently in Harlan looking over the ground.

MIDDLEBORO, KY. — A $250,000 electric power plant, to furnish light and power to the mines and towns of Harlan County, is being considered by Cincinnati capitalists.

TRENTON, KY.—The South Kentucky Power Company has taken the contract to supply current to the town of Guthrie, situated on the Kentucky-Tennessee line, and the transmission line will be constructed immediately. G.

JOHNSON CITY, TENN. — The Breamer Power Company is reported to have completed plans for construction of a hydroelectric power plant at Hampton, Carter County, Tenn., on the Laurel Fork River. It is stated that the dam is to be 100 feet in height. Officers of the company are: president, P. Dungan; vice-president, Sexton D. Dungan; secretary and treasurer, L. D. Gasteiger; general manager, J. H. Grayson.

GORDON, TEX. — The Gordon-Mingus Light Company, of Gordon, Palo Pinto County, has been incorporated with a capital of $6,000 by C. S. White, W. S. Dawson and John W. Goble.

WESTERN STATES.

BOZEMAN, MONT.—A resolution creating Special Improvement Lighting District, No. 91, has been passed by the City Council. The resolution provides for the installation of a street-lighting system on Main Street, from the West Side of Ida Avenue on East Main Street, to the East side of Fourth Avenue, on West Main Street. According to the plans prepared, there will be installed five cluster lamps on a 12-foot pole, on each corner, and eight poles to each block. Sixty-candle-power, nitrogen-filled lamps will be used. In all, there will be installed 46 five-cluster poles and 74 combination light and trolley poles. Bids for materials and installation will be called for by city clerk at an early date.

LEWISTON, IDAHO.—According to recent announcement of A. R. Johnson, manager of the Pacific States Telephone & Telegraph Company, of this city, $13,000 will be expended in improving telephone service in Lewiston and Clarkston.

TWIN FALLS, IDAHO. — The Nevada Copper Mining, Milling and Power Company is preparing to construct a power line to Contact.

FLORENCE, ARIZ.—E. R. Brackett has been granted a franchise for electric power, light and water works here.

LOS ANGELES, CAL.—Bids will be received by the Board of Supervisors up to June 14 for the installation and maintenance of street lights in the Homeward Avenue lighting district.

SOUTH SAN FRANCISCO, CAL.—The Pacific Telephone and Telegraph Company has applied for a franchise in this city, sealed bids for which will be received up to June 21.

CANYON CITY, ORE. — According to reports, a 700-horsepower plant, and electric transmission line will be constructed near here, by the Prairie City Light and Power Company of this city. The transmission line will be constructed between the power plant and John Day, to furnish power for the dredge which is being installed on Canyon Creek. It is understood the plant will be completed and in operation not later than August 1. O.

COLVILLE, WASH.—The Stevens County Power & Light Company, of this city, has petitioned the Stevens County Commissioners for a franchise to dig and maintain a ditch for conveying water from the Colville River, across, over and along the Aris Road, for the purpose of generating electric current. It is understood the company plans making extensions and improvements to its power plant and system here, to accommodate additional business. O.

HILLYARD, WASH.—The water committee of the city council has been empowered to investigate the feasibility of establishing a municipal power plant in this city. Plans formulated to date include the construction of a power house and installation of gasoline engines which will generate current. Bids will be asked for equipment shortly.

OLYMPIA, WASH. — The City Council has granted a franchise to W. W. Manier for the establishment of a power plant and transmission lines to furnish power and light in this city. Active construction of the proposed improvement will begin in the immediate future. W. A. Hoage is city clerk.

PORT TOWNSEND, WASH. — A franchise to construct and operate transmision lines for electric energy along certain highways in Jefferson County, has been granted to James P. Holman, of Port Townsend. Holman agrees to construct and have the line in operation within two years, and has stated that active construction will be ordered within 30 days.

TACOMA, WASH.—$13,500 will be expended immediately in telephone improvements within the Tacoma city limits, according to announcement of John Schlarb, manager of the Pacific States Telephone and Telegraph Company. The expenditure will be made on two contracts, one to be for $10,000 to be used in constructing through the south end of the city, a permanent open-wire route for the important long toll lines; the second for $3,500 to be spent in constructing a cable telephone service across the top of the Eleventh Street bridge, to take place of the present submarine cable. O.

PROPOSALS.

CONDUIT AND WIRING.—Sealed proposals will be received until June 22, for conduits and wiring in the United States public buildings at Detroit, Mich. Address Supervising Architect, Washington, D. C.

ELECTRICAL EQUIPMENT. — Sealed proposals will be received at the office of the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until June 22, 1915, for furnishing 2,700 feet of cable, 66,000 and 400,000 circular mils, Schedule 8414, for delivery at Navy Yard, Key West, Fla.; three ringing telephone dynamotors and miscellaneous telephones and switchboards and spare parts, as per Schedule 8418, for delivery at Navy Yard, Portsmouth, N. H.; 500 igniters and 86 spark plugs for same, and 5,900 spark, magneto and regular-type plugs, as per Schedule 8426, for delivery at Navy Yard, Brooklyn, N. Y.; six each, watthour meters and spare glass covers, as per Schedule 8436, for delivery at Navy Yard, Brooklyn, N. Y. ,and two induction motors, as per Schedule 8403, for delivery at Navy Yard, Washington, D. C.

NAVY ELECTRICAL SUPPLIES. Sealed proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., for furnishing the following materials. Firms interested should apply to the Bureau for the schedule numbers desired. Bids received until June 15 for: Schedule 8358, switchboard and spare parts; Schedule 8366, 12-inch bracket fans, 200-kilowatt turbogenerator sets; Schedule 8377, induction motor, direct-current shunt motor, 120-kilowatt oil-cooled transformer; Schedule 8382, 500,000 and 1,000,000-circular-mil cable. Bids received until June 22 for Schedule 8370, incandescent lamps; Schedule 8373, motors for ventilating sets; Schedule 8374, electric docking telegraphs and steering telegraph indicator; Schedule 8390, electric furnaces and spare parts.

FINANCIAL NOTES.

The property of the Washington-Oregon Corporation, including extensive power projects, street railways and water plants in southwest Washington and Oregon, will be sold at public auction to satisfy a mortgage for $1,569,000 held by the Fidelity Trust Company, of Philadelphia. The properties to be sold include a power and water plant in Hillsboro, Ore.; a street railway system between Centralia and Chehalis, Wash., a distance of four miles; a power plant in southwest Washington and a street railway in Clark County, Wash.

Dividends.

	Term	Rate	Payable
Am. Tel. & Cable	Q	1.25%	June 1
Brazilian Tr., Lt. & Pr. pf.	Q	1.5 %	July 1
Cen. States Elec. Corp. pf.	Q	1.75%	July 1
East. Pr. & Lt. Corp.	Q	1.5 %	June 15
East. Tex. Elec.	S-A	$3	July 1
Indianapolis St. Ry.	S-A	3 %	July 1
Interborough Rap. Tran.	Q	2.5 %	July 1
Muskogee Gas & Elec.	Q	1.75%	June 15
Niagara Falls Pr.	—	2 %	July 15
Tri-City Ry. & Lt., pf.	Q	1.5 %	July 1
United Lt. & Ry. 1st. pf.	Q	1.5 %	July 1
United Lt. & Ry. 2d pf.	Q	0.75%	July 1
Va. Ry. & Pr. pf.	S-A	3 %	July 30
Wash. Ry & Elec.	Q	1.75%	
Wash Ry. & Elec. pf.	Q	1.25%	
West End St. Ry.	Q	2 %	July 1

Reports of Earnings.

BANGOR RAILWAY & ELECTRIC.

	1915	1914
April gross	$ 60,618	$ 56,594
Net after taxes	29,517	30,663
Surplus after charges	11,897	13,122
12 months gross	787,177	775,456
Net after taxes	408,919	422,634
Surplus after charges	199,127	214,442
Balance after preferred dividends	94,127	109,442

AMERICAN POWER & LIGHT.
(Consolidated Earnings of Subsidiaries).

	1915	1914
April gross	$ 562,625	$ 526,647
Expenses and taxes	309,749	281,214
Net earnings	252,876	245,433
12 months' gross	6,799,484	6,134,196
Expenses and taxes	3,578,001	3,292,123
Net earnings	2,221,493	2,842,073

AMERICAN GAS & ELECTRIC.

American Gas & Electric Company reports earnings for the year ended March 31, 1915, as follows:

	1915	1914
Consolidated gross of subsidiaries	$4,510,007	$3,935,432
Balance of subsidiaries' earnings, applicable to A. G. & E.	1,071,855	1,025,804
Other income, A. G. & E.	497,508	369,176
Gross income	1,569,363	1,394,980
Expenses and interest	682,469	668,544
Surplus	886,894	726,436
Debenture interest	60,000	.....
Preferred dividends	100,860	.....
Balance	*726,024	.....

*Equivalent to 19.93 per cent on $3,641,400 common stock.

MONTREAL LIGHT, HEAT & POWER.

The Montreal Light, Heat & Power Company has issued its report for the year ended April 30, 1915. The income account compares as follows:

	1915	1914
Gross	$6,617,000	$6,245,697
Expenses	2,881,000	2,778,451
Net	3,736,000	3,467,246
Interest	489,000	467,977
Surplus	†3,247,000	2,999,269
Dividends	1,791,066	1,700,000
Surplus	1,455,934	1,299,269
Deductions	* 650,000	610,000
Surplus	805,934	689,269

*Depreciation and pension fund.
†Equal to 18.12 per cent on $17,910,662 capital stock as against 16.74 per cent previous year.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	June 7	May 31
American Tel. & Tel. (New York)	122	119
Commonwealth Edison (Chicago)	133½	132¾
Edison Electric Illuminating (Boston)	235	233½
Electric Storage Battery common (Philadelphia)	51¾	50½
Electric Storage Battery preferred (Philadelphia)	51¾	50½
General Electric (New York)	163½	151
Kings County Electric (New York)	119	119
Massachusetts Electric common (Boston)	4½	4¼
Massachusetts Electric preferred (Boston)	35¾	36¼
National Carbon common (Chicago)	137	131
National Carbon preferred (Chicago)		—
New England Telephone (Boston)	129	129
Philadelphia Electric (Philadelphia)	24	23½
Postal Telegraph and Cables common (New York)	77	77
Postal Telegraph and Cables preferred (New York)	66½	65
Western Union (New York)	66¾	66¼
Westinghouse common (New York)	96½	93¼
Westinghouse preferred (New York)	120	120

PERSONAL MENTION.

MESSRS. JAMES R. CRAVATH and W. A. DURGIN, of the Chicago Section of the Illuminating Engineering Society, gave talks, on June 7 and 8, to the students of the Lucy L. Flower Technical High School, Chicago, on the subject "The Proper Illumination of the Home."

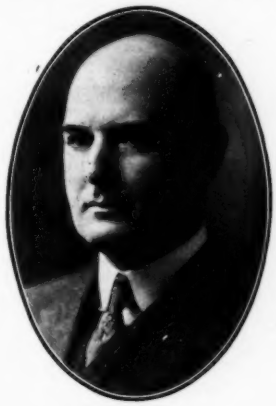
MR. CLARK V. WOOD, vice-president of the Springfield (Mass.) Street Railway Company, has been elected president, succeeding Mr. J. T. Harmer, resigned. MR. FRANCIS H. DEWEY, head of the New England Investment & Security Company, has been elected vice-president, succeeding Mr. Wood.

MR. CLAUDE N. RAKESTRAW, of the Cleveland Electric Illuminating Company, Cleveland, O., was married Wednesday, June 2, to Miss Mollie Kinkade, daughter of Judge and Mrs. R. R. Kinkade. The wedding was a quiet affair, Rev. Allan R. Stockdale performing the simple ceremony, which was witnessed by a few intimate friends only. The young couple left immediately on a two weeks' honeymoon trip, after which they will be at home to their friends in Cleveland.

DR. CHARLES P. STEINMETZ has been elected president of the illuminating Engineering Society. A biographical sketch of Dr. Steinmetz was given in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, October 29, 1910. Since 1910, Dr. Steinmetz has been in charge of the consulting engineering department of the General Electric Company, Schenectady, N. Y. He is also professor of electrophysics in Union University. In 1902, he received the honorary degree of Master of Arts from Harvard University, and in 1903, the honorary degree of Doctor of Philosophy from Union University. His most recent books are "Electrical Engineering Mathematics," and "Electric Discharges, Waves and Impulses." Dr. Steinmetz is vice-president of the International Association of Municipal Electricians, president of the National Association of Corporation Schools, past president of the American Institute of Electrical Engineers, honorary member of the National Electric Light Association, fellow of the American Association for the Advancement of Science, and a member of the American Electrochemical Society, American Physical Society, American Society of Mechanical Engineers, the (British) Institution of Electrical Engineers and a number of other organizations.

Charles P. Steinmetz.

MR. ALTEN S. MILLER has been elected general secretary of the Illuminating Engineering Society. Mr. Miller was born in Richmond, Va., in 1868. He was graduated from Stevens Institute of Technology in 1888, with the degree of Mechanical Engineer. An account of his early work was given in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN for May 28, 1910. After leaving the Union Electric Light and Power Company, at St. Louis, of which he was made president in 1910, he went to New York and joined Dr. Alexander C. Humphreys in consulting-engineering work under the firm name of Humphreys & Miller, Incorporated. He has made a special study of valuation and rate cases for public service companies. Mr. Miller is a fellow of the American Institute of Electrical Engineers and a member of the National Electric Light Association, American Society of Mechanical Engineers, American Gas Institute, Society of Gas Lighting and the Natural Gas Association.



Alten S. Miller.

MR. FRED C. PULLEN has accepted the position of sales manager for C. J. & F. E. Briner, electrical engineers and contractors, and will have charge of the sale of motors, generators, controllers, etc., for which this firm is now agent, and also of a new line of electrical specialities that will be taken on as soon as the new building of the firm at 1007-15 Morgan Street, St. Louis, Mo., is completed. Mr. Pullen has had fifteen years' experience in the electrical business, having started in the testing room of the Western Electric Company in 1900. From there he went into construction work with Kohler Brothers, and was in charge of their work as erecting engineer in all the large cities, from Washington, D. C., to Winnipeg, Man. Desiring to enter the commercial end of the business he became associated with the St. Louis office of the General Electric Company. Later he entered the central-station business, and has had charge of the commercial departments in three of the large plants operated by the Hodenpyl Hardy and E. W. Clark syndicates.

OBITUARY.

MRS. EVA BETHELL, 72 years of age, mother of Mr. Union N. Bethell, of New York, vice-president of the American Telephone nd Telegraph Company, and president of the New York Telephone Company, died at Newburg, Ind., on June 2, as the result of fright. Just before Mrs. Bethell died she said that a burglar had entered her home and threatened to shoot her if she did not give him money.

MR. E. M. REED, one of the oldest construction and maintenance men in the Central West, died recently at Lancaster, Wis. Mr. Reed was taken seriously ill about the middle of May and was taken to his mother's home in Wisconsin, as he had no immediate family. Among work carried out by Mr. Reed were the plants at Pueblo, Colo.; Wichita, Kans., and Fort Leavenworth, Kans. At one time he represented the Monarch Electric Company, and for the past seven years was the representative of the Wagner Electric Manufacturing Company, at Kansas City, Mo.

MR. JAMES P. MALIA, chief electrician for Armour and Company, Chicago, died on May 29, as the result of an operation for appendicitis, and was buried on June 2. Mr. Malia was 54 years of age and unmarried. He was born in Utica, N. Y., and before coming to Chicago held a position with the Western Union Telegraph Company. He had been with Armour and Company for 29 years and since 1894 had been chief electrician. He had charge of the electrical work in all of the company's plants, both outside and in Chicago. Mr. Malia was of a quiet and studious temperament and was well liked by his employees. He was a member of the Jovian Order, of the Illuminating Engineering Society, of the Electric Club of Chicago, and was also a Mason.

James P. Malia.

DATES AHEAD.

Association of Railway Electrical Engineers. Semi-annual convention. Hotel Dennis, Atlantic City, N. J., June 14. Secretary, J. A. Andreucetti, Chicago, Ill.

Electrical Supply Jobbers' Association. Summer meeting, Hotel Statler, Detroit, Mich., June 15-17. Secretary, Franklin Overbagh, 411 South Clinton Street, Chicago, Ill.

Electrical Medical Association of California, San Francisco, Cal., June 15-19. Secretary, H. Scudder, Los Angeles, Cal.

Electrical Contractors' Association of Pennsylvania. Annual convention, Philadelphia, Pa., June 16. Secretary, M. G. Sellers, 1518 Sansom Street, Philadelphia.

Society for the Promotion of Engineering Education. Annual meeting, Ames, Iowa, June 22-25. Secretary, F.

L. Bishop, University of Pittsburgh, Pittsburgh, Pa.

Electrical Contractors' Association of the State of Illinois. Semi-annual meeting, Peoria, Ill., June 25-26. Secretary, E. J. Burns, Rock Island, Ill.

Northern White Cedar Association. Midsummer meeting, Beaudette, Minn., June 25-29. Secretary, N. E. Boucher, 743 Lumber Exchange, Minneapolis.

Michigan Section, National Electric Light Association. Annual convention cruise, Steamer *Rochester*, June 26 to 30. Secretary, Herbert Silvester, 18 Washington Avenue, Detroit, Mich.

American Institute of Electrical Engineers. Annual convention, Deer Park, Md., June 29-July 2. Secretary, F. L. Hutchinson, 29 West Thirty-ninth Street, New York, N. Y.

Ohio Electric Light Association. Annual convention, Cedar Point, Ohio, July 20-23. Secretary, D. L. Gaskill, Greenville, O.

National Electrical Contractors' Association of the United States. Fifteenth annual convention, San Francisco, Cal., July 21-24. Secretary, George H. Duffield, 41 Martin Building, Utica, N. Y.

International Association of Municipal Electricians. Annual meeting, Gibson Hotel, Cincinnati, Ohio, August 24-27. Secretary, C. R. George, Houston, Tex.

American Electrochemical Society. Twenty-eighth general meeting, San Francisco, Cal., September 16-18. Secretary, Joseph W. Richards, South Bethlehem, Pa.

International Engineering Congress, San Francisco, Cal., September 20-25. Executive secretary, E. J. Dupuy, Foxcroft Building, San Francisco, Cal.

Telephone Pioneers of America. Annual meeting, San Francisco, Cal., September 21-23. Secretary, R. H. Starrett, 15 Dey Street, New York, N. Y.

With the Electrical Manufacturers

The Cutter Company, Philadelphia, Pa., has sent out cards suggesting that resolution be made to replace blown fuses with circuit-breakers and showing how a double-pole breaker replaces two fuses and the usual hand switch, at the same time saving much time and trouble.

B. J. Carney & Company, Grinnell, Ia., producers of cedar poles, announce opening of new branch office in the Busch Building, Dallas, Tex. This office is in charge of P. A. Pitcher and has been established so as to permit serving the company's customers in the Southwest to better advantage.

W. N. Matthews & Brother, Incorporated, St. Louis, Mo., has opened a branch office at Salt Lake City, Utah. This office is in charge of F. C. Morton and is subsidiary to the Denver office, which is managed by O. H. Davidson. A full line of samples of Matthews products will be kept at the Salt Lake office.

James Beggs & Company, manufacturers of the Blackburn-Smith feedwater filter and grease extractor and the Beggs sewage ejector system, announce that they have opened offices in Saginaw, Mich., and Cleveland, O. Their representatives at these points will give prompt attention to inquiries received from Michigan and the northern part of Ohio, respectively.

The Pelton Water Wheel Company, San Francisco, Cal., has prepared a leaflet describing in detail its extensive exhibit at the Panama-Pacific International Exposition, San Francisco. A number of views of this exhibit, which occupies an entire block in the Palace of Machinery, are given and each water wheel and other apparatus exhibited is briefly described.

Wheeler Reflector Company, 156 Pearl Street, Boston, Mass., has published a new supplement to its Bulletin R. This deals with Wheeler angle reflectors for lighting tennis courts, bowling greens, bathing beaches and other outdoor recreation grounds. Not only are these reflectors described, but valuable suggestions are given for the design of such outdoor installations.

The Pyrene Manufacturing Company, New York, N. Y., is equipping its six branch offices with automobiles for the use of its salesmen. Each car is, of course, equipped with a Pyrene fire extinguisher. The company has been using motor trucks for delivery service for some time and is providing the new cars merely for greater convenience on the part of its salesmen.

The Leeds & Northrup Company, 4901 Stenton Avenue, Philadelphia, Pa., has issued bulletin No. 210 on a universal lamp and scale for use with galvanometers and similar reflecting instruments. The company has also gotten out an odd-stock list, comprising new instruments slightly damaged and instruments taken in exchange for new instruments. Among these are many bargains.

The Emerson Electric Manufacturing Company, 2024 Washington Avenue, St. Louis, Mo., in its June issue of its house organ, "The Emerson Monthly," describes a line of ceiling fans equipped with Brascolite semi-direct lighting fixtures. The construction of these combination outfits is explained. They make a very much more efficient combination than the old type of ceiling fan with cluster lights.

The Cook Railway Signal Company, Denver, Colo., has prepared a booklet describing its automatic electric highway-crossing gate. This safety device operates practically on the same principle as an upper-quadrant semaphore signal. The operation is explained in detail, also the various methods of installation. A large number of views are shown of typical installations and pointed paragraphs are given to emphasize the need of effective protection at highway crossings.

Hoskins Manufacturing Company, Detroit, Mich., announces the appointment of W. C. Tharp as district manager in charge of its Pittsburgh office, to succeed I. J. Shults, resigned. Mr. Tharp has been associated with the Republic Iron & Steel Company, the Scientific Materials Company, and the Metallurgical Testing Laboratory, of Pittsburgh, and by reason of his past experience and broad acquaintance in the Pittsburgh district, will be able to give especially good service to the various industries in that district in supplying their requirements in the way of electric furnaces, pyrometers, heating appliances and resistors. The company also announces that it has been successful in the suit recently heard in the United States Circuit Court of Appeals for the Seventh Circuit, concerning its patent on an electric resistance element composed of an alloy of nickel and chromium. This patent was issued to A. L. Marsh for an electric resistance element on February 4, 1906, as patent No. 811,859.

Kuhlman Electric Company, Elkhart, Ind., has issued catalog No. 32, describing Kuhlman transformers. The company points out that it is the oldest independent company manufacturing transformers at the present time; this has been its specialty since 1894. The catalog describes the entire line of standard transformers and transformers to meet special conditions. Kuhlman transformers are of the core type and are made both single-phase and three-phase for distributing service, for use on high-voltage transmission lines, for series lighting circuits, for pipe-thawing, and for special high-voltage purposes. Each of these types is illustrated in the catalog.

August Mietz, 130 Mott Street, New York, N. Y., manufacturer of the Mietz & Weiss oil engines, announces that among recent orders for these engines were the following: Grinden Art Metal Company, Brooklyn, N. Y., two 50-horsepower oil engines; Town of Schleswig, Iowa, one 50 and one 75-horsepower engine to drive alternators in lighting plant; George Buckley, Menlo, Iowa, a 40-horsepower engine; C. N. Taylor, Salisbury, Mass., a 25-horsepower engine; I. H. Pitts & Son, Waverly Hall, Ga., a 30-horsepower engine; Marcus Mason & Company, South Framingham, Mass., a 25-horsepower engine; United States Government (for Lightships 101 and 102), two 200-horsepower direct-reversible marine-type oil engines and four 50-horsepower oil-engine air-compressor outfits.

Oshkosh Manufacturing Company, Oshkosh, Wis., is distributing to the

trade its new catalog No. 45. This the company believes to be the most complete manufacturers' catalog of strictly outside construction tools and specialties ever issued. Every operating company is entitled to a copy on request to the Oshkosh office. All standard heavy digging and pole-raising tools are listed, as well as wire reels, tree trimmers, etc. Several new tools are listed.

General Insulate Company, 1008 to 1014 Atlantic Avenue, Brooklyn, N. Y., has recently developed and is now offering to the trade generally, a stock long sought as having properties between the formaldehyde products, such as Bakelite and Condensite, and the best known grades of shellac compositions. This newly developed material the company styles as Grade 57-"Hi-Heet." This has a heat resistance of 250 degrees Fahrenheit, can readily be molded into almost any form or size, has a tensile strength very superior to shellac compositions, and a dielectric strength of 285 volts at a thickness of 250 mils. The main object sought for by the company in the development of Grade 57 was heat resistance, as a great demand has grown in the last several months, particularly among automobile manufacturers, for a stock with high heat resistance and lower cost than the formaldehyde products.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued some new publications, among which is descriptive leaflet No. 3796, which covers small direct-current generators known as type CD, ranging in capacity from one-fourth to two kilowatts, and 125 to 250 volts; these generators are particularly adapted for use as exciters, charging storage batteries, lighting country residences and small industrial plants in localities where central-station power is not available. Two new switchboard publications have been issued by the company; these are Sections DS 1439 and 1456, the former covering alternating-current boards with hand-operated oil circuit-breakers, and the latter rotary converter panels; complete detail information is given on these types of boards, including a number of diagrams, and suggestions as to the best method of assembly. "The Relation of Trolley-Feeder Taps to Machine Flashovers" is the title of an article which recently appeared in the *Electric Journal* and which has been reprinted in pamphlet form by the company; the article discusses this question, giving reasons for the application of the tap and various conditions effecting the flashover; numerous incidents are cited where rotary converters had flashed over. Textile Quarterly No. 8, just issued, is devoted to a description of the new pressed-steel-frame induction motor recently brought out by the company especially for textile work; the method of rolling frames is described and illustrated and other details of construction carefully explained; the method of testing the motor against shocks and vibrations is also explained with the aid of several illustrations.

Record of Electrical Patents

Issued by the United States Patent Office, June 1, 1915.

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,141,107. Telephone Transmitter. W. W. Dean, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Constructional details comprising supplementary diaphragm.

1,141,109. Electropneumatic Brake for Railway Cars. J. S. Doyle, assignor to the Westinghouse Air Brake Co., Pittsburgh, Pa. Controlled from both motorman's and master switches.

1,141,114. Controller for Fluid-Pressure-Actuated Devices. C. T. Henderson, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Pressure-operated valve has full movement secured by electrical means.

1,141,117. Method of Reducing Coke to Produce Battery Carbons. H. T. Johnson, New York, N. Y.; N. F. Johnson, administratrix of H. T. Johnson, deceased. Raised to high heat by burning in furnace, then agitated and air forced through until impurities are removed and low resistance secured.

1,141,118. Kiln or Furnace for Treatment of Carbonaceous Materials. H. T. Johnson, by N. F. Johnson, administratrix. Related to above.

1,141,119. Indicating Relay. W. Kaisling, assignor to Kellogg Switchboard & Supply Co. Has means for indicating whether energized or de-energized.

1,141,120. Casing Cap for Lamp Sockets. C. J. Klein, assignor to Cutler-Hammer Mfg. Co. Of heavy stock.

1,141,121. Separable Connector for Electrical Conductors. C. J. Klein, Milwaukee, Wis. Two-part, with contacts constructed to prevent relative rotation.

1,141,122. Stage Footlights. A. T. Kliegl, New York, N. Y. Pivoted individual lamp carriers. (See cut.)

1,141,127. Electric Signal. J. Lièvre, Corpus Christi, Tex. For motor water jacket.

1,141,133. Gas-Tight Seal. K. Mensing, assignor to General Electric Co. For electric vacuum tube.

1,141,147. Railway Signal Apparatus. C. F. Rumold, Berea, Ky. Block system in which signal motor apparatus is controlled by three circuits, one through each rail and one through both rails.

1,141,152. Portable Support for Electric Lamps. O. E. Stahl, Pittsburgh, Pa. Adjustable mounting on clamp for gripping chair, table or bed.

1,141,154. Motor-Controller. L. L. Tatum, assignor to Cutler-Hammer Mfg. Co. Several motors automatically reversed periodically at different times and manual means for reversing at will.

1,141,158. Blowout Device for Electric-Pump Governors. W. V. Turner assignor to the Westinghouse Air Brake Co. Air pressure opens valve against force of spring and permits switch to operate.

1,141,166. Coil-Former for Armatures. J. A. Wirth, assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Details of former for half-coils.

1,141,174. Electromagnetic Switch. L. G. Copeman, assignor to Copeman Electric Stove Co., Flint, Mich. Magnet releases catch of circuit-breaker.

1,141,175. Electric Stove. L. G. Copeman, assignor to Copeman Electric Stove Co. Construction of oven and heating plate therefor.

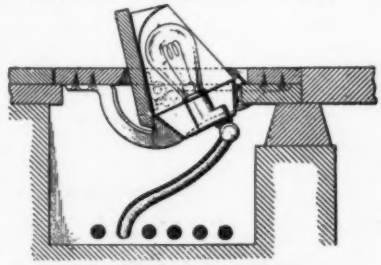
1,141,176. Electrically Heated Oven. L. G. Copeman, assignor to Copeman Electric Stove Co. Plate radiating heat from one side may be secured in different positions in oven.

1,141,187. Electric Alarm-Bell. G. A. Huber, New York, N. Y. Details of bell structure.

1,141,188. Metallic Molding. G. A. Johnson, Newark, N. J. Has J-shaped trough body with L-shaped cover clamped by longitudinal edges of body.

1,141,197. Electrical Heater. A. S. Mack, Klamath Falls, Ore. Casing having inlet and outlet pipes has centrally arranged heating unit comprising metal tube packed with asbestos containing heating coil.

1,141,199. Three-Phase Transformer. W. S. Moody, assignor to General Electric Co. Relates to the circulation of cooling oil.



No. 1,141,122.—Footlights.

1,141,203. Fan and Fixture Support. D. H. Murph, assignor of one-half to H. E. Hobson, Dallas, Tex. Means for securing supporting hook to ceiling.

1,141,216. Electrical Recording Apparatus. A. L. Sohm, assignor to Sohm Electric Signal & Recording Co., Chicago, Ill. Electromagnetic means for adjusting and printing from a type bar.

1,141,251. Plate for Secondary Batteries. J. O. Luthy, San Antonio, Tex. Is covered by foraminous conducting screen over which is a porous enamel-like coating.

1,141,279. Telephone Apparatus. T. Smith, assignor to T. Smith Mfg. Co., Chicago, Ill. Adjustable bracket.

1,141,287. Floor Polisher. W. B. Thayer, Kansas City, Mo. Has motor switch on, and conductors in, tubular handle.

1,141,300. Circuit-Breaker. B. F. Bailey, Ann Arbor, Mich. Rotary; cam-operating contacts moved with actuating shaft in one direction only.

1,141,307. Thermo-Electric Regulating System. G. N. Blanchard, assignor of one-half to H. Busch, Jr., San Francisco, Cal. Valve electrically controlled by Bourdon tube connected with chamber having its pressure raised by heat.

1,141,316. Cable Hanger. W. L. Cockrell, Cameron, W. Va. Two-part and of figure-8 section, upper part securing to messenger wire.

1,141,327. Automatic Burglar-Alarm System. L. H. German, Louisville, Ky. Telephone receiver lifted from hook on opening door.

1,141,336. Magneto. P. Hamm, Milwaukee, Wis. Rotatable magnets and comprises primary, secondary, interrupter and spark-shifter.

1,141,344. Automatic Whistling Device. G. J. Juntunen, Dollar Bay, Mich. Electromagnet operating whistle has circuit closed at predetermined points of locomotive travel.

1,141,352. Semi-Automatic Telephone-Exchange System. F. R. McBerty, assignor to Western Electric Co., New York, N. Y. Sending device.

1,141,358. Drink-Mixing Machine. R. W. Portmann, Norwood, O. Agitator in bottom of container driven by electric motor in base.

1,141,359. Switch Box. A. C. Power, Pendleton, Ore. Details of casing for wall switch.

1,141,363. Installation Permitting of Electrically Actuating Apparatus at a Distance from a Central Station. E. Schneider, Le Creuzot, France. Has indicators at transmitting and receiving stations and means for synchronizing.

1,141,367. Telephone Call-Registering Device. V. Thompson, Vancouver, B. C., Canada. Electromagnetically operated and coin-controlled.

1,141,380. Electrical Measuring Instrument. F. Conrad, assignor to Chicago Electric Meter Co., Chicago, Il. Registers and indicates power consumed in circuit and prints maximum during given interval.

1,141,386. Method of Transmitting and Receiving Electrical Energy. R. A. Fessenden, assignor to S. M. Kintner, Pittsburgh, Pa., and H. M. Barrett, Bloomfield, N. J. Simultaneously sends and receives wireless signals.

1,141,387. Aerial Conductor. S. Franklin, assignor to Marconi Wireless Telegraph Co. of America, New York, N. Y. Closed circuit in vertical plane with distributed condensers neutralizing the inductance.

1,141,393. Safety Coupling-Release System for Railway Trains. A. F. Hetherington, New York, N. Y. Electrically controlled uncoupling accomplished when engine is derailed.

1,141,400. Cap for Incandescent Lamps. A. Marin, Vitry-sur-Seine, France. Has shaped socket of aluminum with bottom of hardened cardboard.

1,141,402. Electrolytic Apparatus Employing Filmed Electrodes. R. D. Mershon,

New York, N. Y. Condenser having aluminum electrodes coated with heat-resistant electrolytic films in an original electrolyte containing borax and free acid.

1,141,406. Trolley Wheel. J. C. Ollard, Tacoma, Wash. Relates to mounting of wheel in harp.

1,141,407. Trolley Harp. J. C. Ollard Relates to the wheel contacting means.

1,141,412. Manipulation of Sheet-Metal Plates. E. C. Pool, New Castle, Pa. Plates are carried by a lifting magnet in a tinning machine.

1,141,440. Insulated Rail Joint. B. G. Braine, assignor to Rail Joint Co., New York, N. Y. Joint bar in contact with one rail head insulated from other by air gap.

1,141,453. Apparatus for the Transmission and Receipt of Electrical Energy. R. A. Fessenden, assignor to S. M. Kintner, Pittsburgh, Pa., and H. M. Barrett, Bloomfield, N. J. Wireless telegraph with locally excited coil annuiling local disturbance and signal-receiving coil co-operating therewith to affect indicator.

1,141,456. Picture-Slide Controller for Stereopticons. V. Frederiksen, Roanoke, Va. Electromagnetically actuated slide-carrying drum.

1,141,460. Electric Switch. M. Guett, assignor to Hart & Hegeman Mfg. Co., Hartford, Conn. Has oscillating quick-break mechanism.

1,141,474. Insulator Generator. J. L. Milton, assignor to Webster Electric Co., Racine, Wis. Multipolar permanent field magnets having induced windings thereon and rotor varying magnetic circuit.

1,141,484. Terminal Fitting for Electric Conduits. J. C. Phelps, Springfield, Mass. Cap with oppositely disposed, inclined, wire-receiving recesses.

1,141,506. Electrical System of Distribution. W. A. Turbayne, assignor to Gould Coupler Co., New York, N. Y. Regulation of axle-driven car-lighting apparatus.

1,141,507. Automatic Stopping Device for Phonographs. E. C. Walter, New York, N. Y. Contacts controlled by sound arm.

1,141,509. Car Signal. S. Wideman, Niles, Mich. Construction of lamp box having reflectors.

1,141,512. Trolley Wheel. H. C. Adam, Hamilton, and J. C. Adam, Trenton, Ont., Canada. Details of anti-friction bearing.

1,141,517. Electrical Welding Apparatus. W. E. Andrews, assignor of one-half to W. A. Stellers, Bellaire, O. Machine for welding end closures on tubular bodies.

1,141,518. Trolley-Wheel Mount. L. W. Ashley, assignor of one-half to E. M. McVicker, Milwaukee, Wis. Harp has a hinged side to permit removal of wheel.

1,141,523. Electrical Measuring Instrument. I. W. Brogger, Newark, N. J. Indicating instrument having means for keeping magnetism constant through coil in different angular positions.

1,141,526. Storage-Battery Cell. R. N. Chamberlain, assignor to Gould Storage Battery Co., Depew, N. Y. Positives hold active material internally exposed to electrolyte and negatives are exposed to electrolyte on outside only.

1,141,530. Treatment of Iron. A. V. Dismore, County of Buckingham, England. To change characteristics; consists in plating with desired materials first at low and then at high voltage.

1,141,548. Controlling Device for Motors. F. Hymans, assignor to Otis Elevator Co., Jersey City, N. J. For induction motors; switch for varying secondary resistance.

1,141,576. Electric Heating Device. E. J. Ovington, assignor to Simplex Electric Heating Co., Cambridge, Mass. For immersion in liquids to be heated and having automatic disconnecting means.

1,141,598. Circuit-Wire Terminal. A. A. Ziegler, Boston, Mass. For securing to a terminal strip.

1,141,606. Thermostat. J. Boekel and J. Scherer, assignors to said Boekel, Philadelphia, Pa. Constructional details of compound metal bars and contacts carried thereby.

1,141,634. Tubular Electric Pocket Lamp. G. P. Heinrich, assignor to Interstate Electric Novelty Co., New York, N. Y. Details of switch.

1,141,637. Electric Light Fixture and the Like. W. D. Herwig, Jr., Chicago, Ill. Wall bracket.

1,141,642. Electrical Measuring Apparatus. O. A. Knupp, assignor to Pacific Gas & Electric Co., San Francisco, Cal. Segmental core is placed about alternating-current cable and connected through range adjuster to ammeter.

1,141,647. Means for Controlling Flow of Fluids. L. A. Merk, assignor of one-half to J. Hay, Pittsburgh, Pa. Quick-moving valve automatically limits operation of driving electric motor.

1,141,655. Electric Railway System. W. Robinson, Brooklyn, N. Y. Sectionalized third rail; successive energization of sections controlled by contact shoe.

1,141,674. Safety Device. F. P. Withers, assignor to Associated Engineers Co., Chicago, Ill. Lineman's protector for mounting on cross-arm.

1,141,679. Electrically Driven Hoist. W. A. Barker, assignor to Thomas Elevator Co., Chicago, Ill. Mounting and gearing of drums and motor.

1,141,685. Sign. G. O. Belknap, assignor to W. C. Belknap, New York, N. Y. Electrically lighted and exhibits different inscriptions with different adjustments.

1,141,686. Attachment Plug. E. D. Jones, Moline, Ill. Two-part; connections in plug automatically broken on removal from socket. (See cut.)

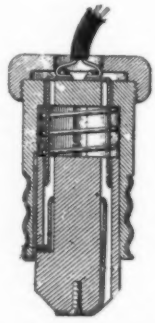
1,141,689. Electric Embossing Apparatus. E. N. Chandler, assignor to Simplex Electric Heating Co. Die head is electrically heated.

1,141,691. Illuminated Sign. A. F. Conner and G. L. Willett, assignors to Thos. Cusack Co., Chicago, Ill. Character of V-shaped section in an opening in a plate reflects light outwardly.

1,141,701. Vehicle Indicator. P. H. Fielding and F. E. Lewis, said Fielding assignor to said Lewis, Saugatuck, Conn. Lamp, indicator and audible signal controlled by brake.

1,141,716. Combined Fire Escape and Alarm. C. R. Kjellstrom, Rockford, Ill. Circuit controlled by movable ladder rung.

1,141,717. Transmitting Intelligence by Radiant Energy. J. W. Lee and J. L. Hogan, Jr., assignors to S. M. Kintner, Pittsburgh, Pa., and H. M. Barrett, Bloomfield, N. J. Amplifier and discriminator wherein signal waves are received on circuit constantly excited with current of a frequency adapted to form beats with the frequency of the received energy and an indicator operated by the resultant current rectified.



No. 1,141,686.—Attachment Plug.

1,141,718. Screen for Headlights and Other Lamps. J. J. Martin, St. Louis, Mo. Crate-like screen, having ceilings only of compartments reflecting, is in front of lamp.

1,141,729. Recording Instrument for Wattmeters. S. B. Storer, assignor to Chicago Electric Meter Co., Chicago, Ill. Timekeeping mechanism electrically actuates periodic printing means for integrating meter.

1,141,740. Electric Display Board. N. L. Wine, Fort Myers, Fla., assignor of one-fourth each to F. T. McNulty and L. C. Curtright. Figure traced on blackboard reproduced in bank of lamps.

1,141,751. Printing Telegraph System and Alphabet. C. G. Ashley, assignor to General Engineering & Construction Co., Toronto, Ont., Canada. Alternating-current-operated, tape-controlled sender.

1,141,752. Secondary Clock Movement. F. S. Atkinson, Brookline, Mass. Actuated by electromagnetic vibrator.

1,141,772. Vending Machine. J. Cartun, Philadelphia, Pa. Electromagnetically operated, coin-controlled, paper vender.

1,141,776. Tail Lamp. P. Cooper, Ada, Mich. Independently energizable lamps eccentrically mounted in casing, one lamp having colored screen and other having reflector throwing light on road.

1,141,780. Headlight. J. R. Davis and U. M. Richardson, assignors to Rex Revolving Light Co., Vine Grove, Ky. Carried on bracket extending outwardly and upwardly from front axle.

1,141,801. Display Sign for Store Windows. O. James, Fall River, Mass. Illuminated ground glass plate behind stencils.

1,114,802. Absorption Dynamometer. N. C. Johnson, assignor to Tinius Olsen Testing Machine Co., Philadelphia, Pa. Electromagnetic brake receives current from generator driven by rotating part.

1,141,803. Electric Switch. F. Kemerer, Kersey, Pa. Control switch for mining turbine pumps.

1,141,820. Liquid-Level-Alarm Apparatus. L. Mozolan, Montgomery, Ala. Float-actuated circuit-closer.

1,141,823. Telephone Signal. E. H. Osborne, Sauk Center, Minn. Arrangement of magneto and connections for ringing on a number of lines simultaneously.

1,141,833. Magnetic Ore-Separator. S. R. Salwen, assignor to American Grondal Co., New York, N. Y. Comprises a multipolar electromagnet inside a magnetic drum, the magnet and drum rotating in opposite directions.

1,141,836. Device for Working Weak-Current Installations. F. Schröter, assignor to Elektrizitäts-Aktien-gesellschaft Hydrawerk, Charlottenburg, Germany. Employs a plurality of storage batteries with means for automatically charging them.

1,141,847. Pressure-Controlled Electric Switch for Motor-Operated Pumps. S. S. Stahl, Connellsville, Pa. Details of switch-operating means.

1,141,850. Image-Transformer for Distance Photography. C. Stille, Zehlendorf-West, near Berlin, Germany. Process of converting light rays consists in polarizing and subjecting the polarized light to influence simultaneously of strong direct and weak alternating currents.

1,141,860. Electric Motor or Generator. H. A. Balcome, assignor to the Holtzer-Cabot Electric Co., Brookline, Mass. To promote cooling and exclude dust has rotating parts thinly covered and air blown over outside of covering.

1,141,866. Telephone Pay Station. G. Christian, Detroit, Mich., assignor to Wilcke-Armstrong Co., Detroit, Mich. Coin-controlled signaling device at central-energy instrument.

1,141,868. Automatic Telegraphy. P. B. Delany, assignor to Telepost Co., New York, N. Y. Tape-controlled transmitter.

1,141,871. Boring Mill. W. J. Hagman and E. H. Wray, Philadelphia, Pa. Mounting and connection of driving motor.

1,141,873. Automatic Control System for Railway Trains. A. S. Jones, assignor of one-half to L. C. Cummings, Brookline, Mass. Block system wherein electromagnetic system in roadbed and on car sets brakes, blows whistle and lights lamp when block ahead is occupied.

1,141,880. Lamp. J. F. Mitchell, assignor to E. P. Young, Los Angeles, Cal. Adjustable arrangement of reflectors and lamp support in a headlight.

1,141,888. Portable Electrically Heated Radiator. C. Schmidt, Spokane, Wash. Contains water; heating current is regulated according to steam pressure generated.

1,141,891. Coil-Former for Armatures. J. A. Wirth, assignor to Westinghouse Electric & Mfg. Co. Constructional details.

Patents Expired.

The following United States electrical patents expired on June 7, 1915:

605,067. Electric Switch. C. C. Badeau, Schenectady, N. Y.

605,090. Electrical Apparatus for Charging Furnaces. J. P. Eck, Muncie, Ind.

605,109. Insulator. F. M. Locke, Victor, N. Y.

605,115. Rail Bond. G. Moffat, New York, N. Y.

605,174. Induction Coil. A. L. Bogart, Jamaica, N. Y.

605,194. Electric Transformer. J. J. Bellman and C. T. Rittenhouse, New York, N. Y.

605,197. Electrical Valve-Controlling Device. A. E. Colgate, New York, N. Y.

605,211. Trolley Switch. J. H. Vanasselt, Seattle, Wash.

605,228. Electric Arc Lamp. W. Hochhausen, Brooklyn, N. Y.

605,251. Trolley-Wire Hanger. G. E. Johnson, Los Angeles, Cal.

605,256. Insulator. R. D. Mershon, Colorado Springs, Colo.

605,260. Mounting for Third Rails. S. H. Short, Cleveland, O.

605,261. Third Rail for Electric Railways. S. H. Short.

605,279. Safety Lock for Incandescent Lamps. E. Faller and H. Herbstritt, San Francisco, Cal.

605,294. Telephone Holder. J. T. Moore, Minneapolis, Minn.

605,304. Controller. T. von Zweigbergk, Cleveland, O.

605,317. Electric Railway System. W. Lawrence, New York, N. Y.

605,326. Trolley Connection for Electric Cars. J. G. McLaughlin, Brooklyn, N. Y.

605,341. Telephone System. R. T. Reid and J. L. McDonnell, Tacoma, Wash.

605,345. Call-Box System. E. E. Salisbury and A. E. Dean, Tacoma, Wash.

605,358. Signal Device. F. B. Taylor, E. E. Salisbury and A. E. Dean, Tacoma, Wash.

605,424. Connector for Storage-Battery Plates. G. Hart, Detroit, Mich.